

Australian Personal Computer

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Two
low cost
PC-compatibles
compared

AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE



SHARP GETS IT RIGHT
The 'flat screen' comes of age in a IBM PC-compatible

**NOW WITH
80286 & Z80H**

Universe

Security and speed
Software compatibility, and

Forget conventional networking. Universe provides superior speed and security necessary in multiuser applications. Running the widest range of 8 and 16 bit software, it has the ability to network IBM PCs and workalikes in the fastest multiuser/networking microcomputer system in the world.

Multiuser - efficiency

A single Universe runs up to 25 workstations, each with any combination of 8 and 16 bit programs. Advanced AED network technology allows expansion to 100's of users.

Multitasking - productivity

Each operator can use any four 8 and 16 bit programs at the same time. Switching screens takes only a single keystroke.

Networking - flexibility

Up to 255 MS-DOS machines. IBM PCs and workalikes can be linked into the Universe system using a high speed DR Net local area network.

IBM PCs and workalikes can run applications written for Concurrent PC DOS, CP/M-86 and PC-DOS, while having access to all the benefits of the network. PC users share files, records, printers and other network resources.

Software - compatibility

Dual processor design, provides access to the world's largest software base via CP/M, MP/M and MS-DOS. With AED's new Concurrent DOS you have the best of all worlds.

DMA hard discs and the new high-speed 80286/Z80H dual processor CPU furnish performance necessary to handle multiple 8 and 16 bit programs.

Tough

The Universe is built on a strong square tube frame.

Stays Cool

No fancy operating environment needed. Every Universe is tested at 42 degrees C.

Flexible

Universe accepts an extensive range of terminals, printers, modems, even electronic telex.

Expandable

20 slot shielded S100 buss. Obsolescence proof using IEEE 696 S100 cards.

Speed and Security - essential to your business

Most networks are slow and insecure. Universe shines here, with full multilevel security enhancements normally found on well engineered minicomputers. Universe is engineered from the ground up to provide facilities essential for the smooth running of a large multiuser system.

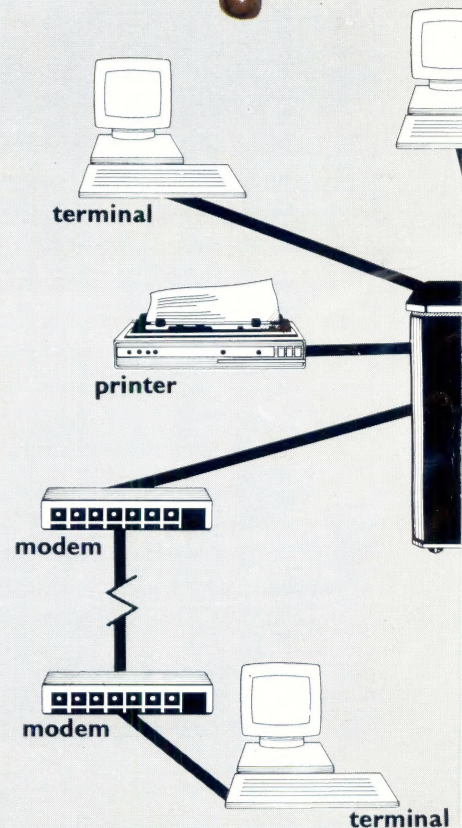
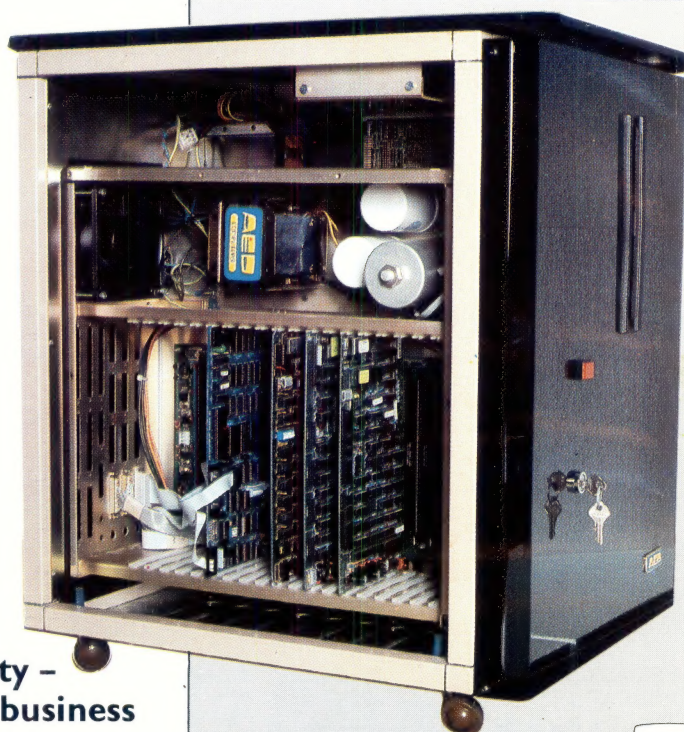
Important Security features

Encrypted login passwords.

Users are restricted to specific terminals, directory areas, programs and nodes on the network.

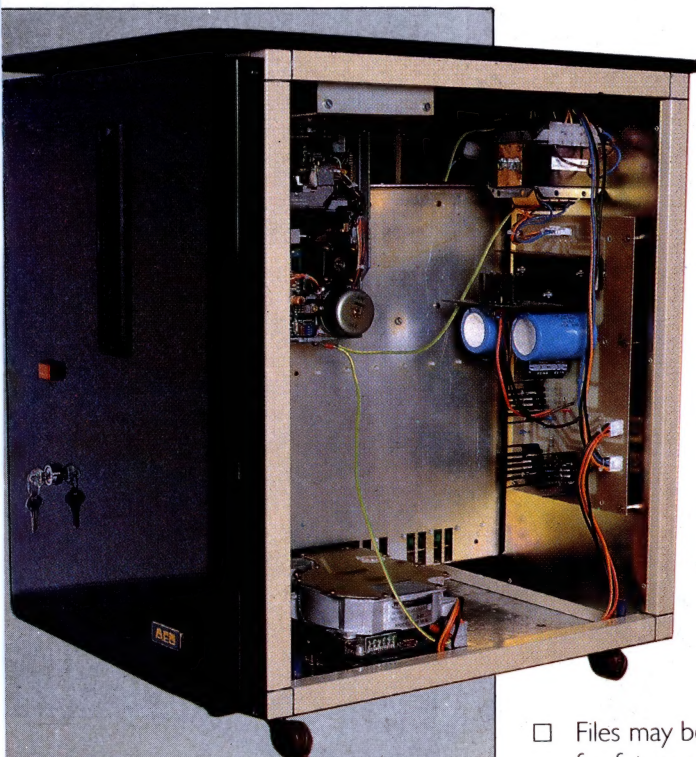
File passwords. File and record lockout and a full password hierarchy. Your System Manager can quickly and easily configure the system so that each terminal only has access to those facilities and data its operator needs. For example:

- ☐ Option to restrict any account to specific programs or workstations



Multuser

of a minicomputer.
reliability of a supermicro.



Smart

Powerful file I/O processor makes Universe operation faster, leaving the CPU free of repetitive tasks.

Fast

High speed (8MHz) dual processor design (80286 plus Z80H) with options for 68000, 16032 etc.

Durable

Ebony glass top and acrylic epoxy finish

Capacity

3 Winchester plus removeable cartridge totalling up to 300 Megabytes total storage.

- ☐ Files may be automatically dated for future reference. Optional timestamping shows both creation and last access.
- ☐ Optional passwords on computers within a local area network.

Operating features

- ☐ Low cost serial terminals support both 16 bit (CP/M, Concurrent DOS, MP/M-86) and 8-bit (CP/M, MP/M II) software
- ☐ 200 character type-ahead buffer per terminal
- ☐ Fast 'hashed' directory searches
- ☐ A secure electronic mail facility. Optional electronic Telex.
- ☐ A multiuser appointment calendar
- ☐ Optional 8087 maths coprocessor
- ☐ Inter-terminal communication. Electronic mail is here!
- ☐ A programmable keys utility so users can redefine their keyboards
- ☐ Optional telecommunications with remote computers via modem

Full Field Support

We were the first company in Australia to introduce full 12 month on-site maintenance (now extendable to 2 years at time of purchase). All service and engineering support is carried out by AED directly.

Australia wide network

Field service is presently within 24 hours on the east coast and within 48 hours for country areas.

Our network is being aggressively expanded.

Inherent high reliability and modular construction minimize downtime and make service to the most remote locations feasible.

Customer support

Our very first system buyer is still a valued customer. We take special pride in supporting every existing customer and in providing the highest standard of service at every stage. As part of this support, the Universe is continually being refined in response to the needs of existing customers and Australian business.



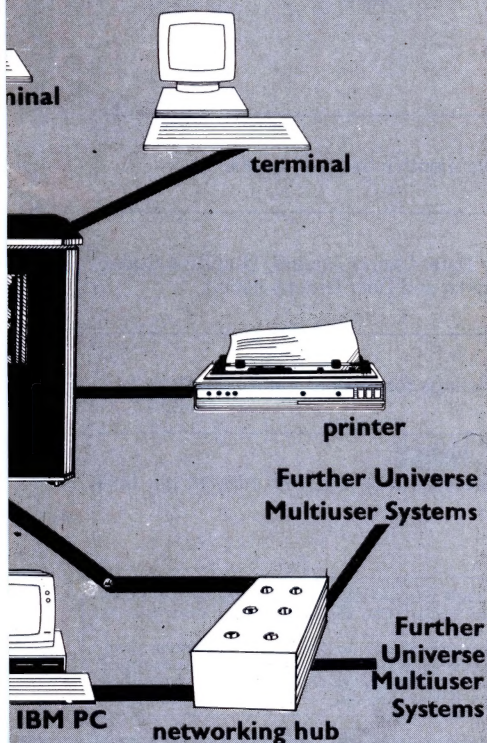
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53 Waverley Rd., East Malvern 3145.
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Ph: (09) 450 5888



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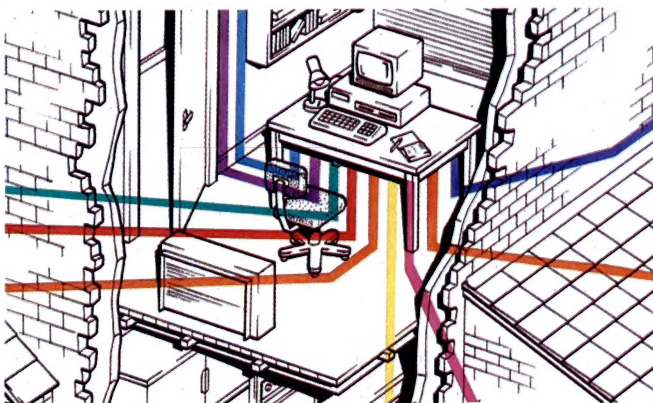
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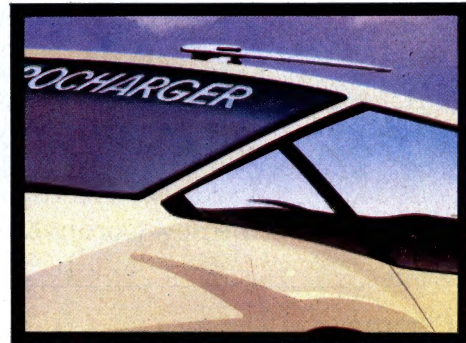
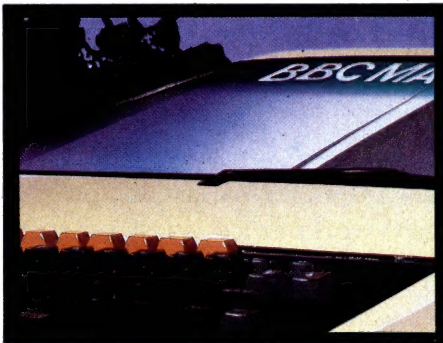
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David MacKay gives BBC owners the chance to soup up their machines with simple assembly language macros inside Basic programs.

111 ARTIFICIAL STUPIDITY

At last! All those routines that programmers have just been failing to build into their software. Bryan Baker speaks for us all.





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conventional PC
network has
done this much
paperwork,

the new Corona
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AWA COMPUTERS

132 Arthur Street, North Sydney NSW 2060

All the news that's fit to print from APC's world-wide network of reporters.

Mark II

Commodore has cleaned up its act and redesigned its PC. The new machine is due for relaunch in January, my sources say.

There were two main problem with the original model, I gather. Firstly, quality control on the machine was faulty; and, secondly, the system wouldn't accept add-in boards of the kind that much IBM software expects these days.

The good news is that the redesign is complete, with a new motherboard, and tried and tested compatibility with plug-ins. The bad news is that the relaunch was, at the time of writing, not entirely guaranteed.

The problem is simple: the Commodore PC was one of the cheapest imitations on the market when it was launched, and people queued up to buy it, especially in Germany. By the time the redesign is in full production, it will be unremarkable in price due to the flood of new machines coming onto the market.

As an example of how low it can go, take Dick Smith's Multitech starting at \$1395, or Tandy's Model 1000 at \$1,799, including monitor.

And there are lots of others, which a quick look at the ad pages will reveal.

Not all these new, ultra-cheap clones are worth buying.

For example, some of them, like the original Challenger, will turn out to have ROM chips with IBM copyright code in them. A good sign of this is their failure to print the copyright sign when they are switched on.

Others will be IBM computers without the IBM badge — a production run of boards which the sub-

contractor has diverted from IBM to the end-user market, and which may never be repeated. Go back for spares two years later, and not only may the 'manufacturer' prove untraceable, but the dealer may deny all knowledge of the 'former management' which 'used to sell' your computer.

Nonetheless, a good guide for the next three months, of a genuine attempt to give value for imitation IBM money, will be that a two-disk machine with display (mono) will cost \$2359, and a 10Mbyte hard disk version will cost \$3960; and that some money is being spent on advertising the things.

After that, I expect prices to collapse a bit further, as hard disks reach suppliers for well under \$200, and around May/June, when Amstrad launches a PC software machine (not a

clone, I don't expect), a single-disk system should be fetching around \$1,200, with display and 256k. *Guy Kewney*

A rise in sight?

Bad news, I'm very much afraid, on memory prices for next winter — unless, of course, you are a semiconductor manufacturer trying to raise capital.

In brief, the American memory chip makers are about to give up and leave the field to the Japanese.

In March 1986, both Panasonic and Toshiba, according to my American source, are planning to release megabit chips, which means just eight chips to do the job that 32 do now, to provide 1Mbyte of RAM.

That release is in production volumes, not initial samples.

According to the *California Technology Stock Letter*, a resource that has never given me anything less than interesting information before, the news is good for American chip makers, because they can now 'stand and fight in other markets'.

The CTSL believes that end-user business is picking up in other markets, and that 'it seems pointless for any US company to try to compete in the RAM market with the Japanese.'

Well, perhaps, but from the micro user's point of view, it couldn't come at a worse time.

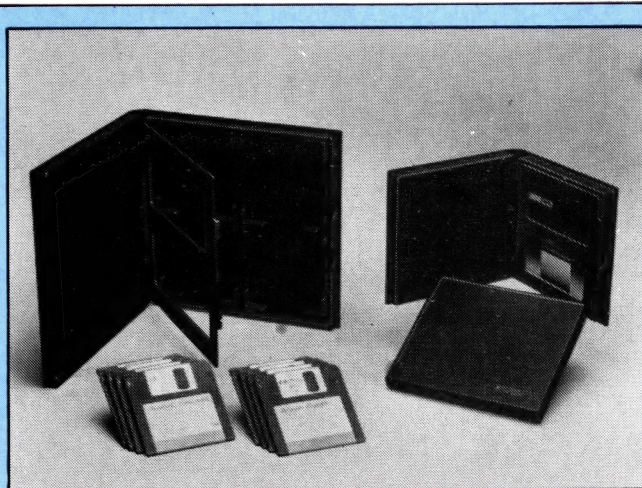
We need cheap memory. And in the past, the cost of the 64k bit memory chip has been forced down to virtually nothing by the arrival of the 256k bit chip, which in turn has had to come down to compete with its forbear.

If Japan isn't given tough competition from American memory chip makers, then there's no point in pricing the megabit chip very low.

At the same time, I see the demand for big memory increasing. It's true that current micros have tiny memories in terms of the number of chips, compared with five years ago.

But with the arrival of machines like the Amiga, that will change. Buyers of that machine will take one look at its 256k memory, burst into merry tears of laughter, and go out to buy another couple of megabytes. With today's 256k bit RAM prices, a couple of megabytes could cost as much as \$1,000, but what is that compared to the price of a business system?

And you can't squeeze more than two 68000-type applications into 256k. Even



In espousing the virtues of its floppy disk transportation system, the distributor of this product had this to say about the hitherto previous method of disk despatch: "Opening a hand made mailer brings us face to face with the danger of bending the diskette. Even when you open the most rigid of commercial containers, the manufacturers have bent over backwards to make the thing so dustproof that it is nearly impossible to open. When it does open, the diskettes fly all over the room."

Anyone this strikes a chord with should call (03) 544 4000 for more details.

512k is making it squeak rather, as any Switcher user on Macintoshes will tell you.

I'm expecting demand for memory, and shortages due to the Americans' decision to leave it out. National Semiconductor was the most recent to announce it was pulling out: others have mothballed plant or decided to build other chips.

The *Stock Letter*, by the way, is contactable through Venture Capital Management Inc, 155 Montgomery Street, Suite 1401, San Francisco, Ca 94104 USA, or on (415) 982 0125.

Believe it or not

How can I ask you to believe the ridiculous facts of memory expansion business in the MS-DOS market, when even after careful

research, I have trouble believing it myself?

Answer: I hope you will agree that the obscurity hides two new IBM micros, to be launched next year. I'll try to explain, and don't blame me if it sounds silly, because it is.

Take the AST Rampage memory expansion board, designed for both PC and AT family machines.

Theoretically, using Rampage boards, you can now expand these systems up to 8Mbytes of internal RAM; that's roughly the same as that provided by the Lotus/Intel board.

The difference between Rampage and Lotus boards is simple: Lotus allows you to expand the data stored in the system, not the size of programs you can run.

Technically, the 8086 and family is incapable of counting memory locations beyond 65535, so it addresses blocks (of that

many bytes each) at a time. That's 64k each. To help, it keeps data in one 64k block, the program in another (it can be the same one) and the stack in another (again, it can be the same), and it has three registers to keep track of these memory blocks.

The Lotus/Intel board allows only the data register to look beyond 640k (the limit on the IBM PC). You can't put program instructions in the extra memory. Well, you can, but you have to go and get them before you can run them — and you have to transfer them into program-legal memory first, one byte at a time. It doesn't take long — less than one second per 64k byte block. In other words, in computer terms: forever.

The Rampage allows expansion of the data and stack pointers, too. And it also allows more than one 64k segment to be 'open' to the system.

Of course, it gets more amusing: on the AT, the chip inside can address 16Mbytes.

Under MS-DOS, as I've remarked, unbelievably, before, it doesn't matter if there can be 16Mbytes plugged in, and that the chip can address 16Mbytes; the limit is defined arbitrarily, and it's 640k, to be compatible with the PC.

Programs like Ashton-Tate's Framework II use the Rampage board (A-T helped design it). On an AT, you can have the Advantage board plugged in, working as a RAM disk, and the Rampage board acting as memory extension, but you can't get at the actual memory as if it were real memory, for running big programs. Which means, naturally, you can't have more than one or two large concurrent programs, either.

This is a vacuum into which Microsoft, IBM and

What do all these magazines have in



They all applaud Framework.

“In summary, Framework is an impressive product, and pleasing to use. It allows you to create, modify, organise and analyse information and to present it in a professional way. Its strengths lie in its text management, its ease of use, and the way it allows you to organise inter-related information.

AUSTRALIAN SOFTWARE GUIDE OCT 84.

Framework seems to have no particular bias to one work orientation or another; that is, it's not a spreadsheet with added-on features, nor is it a database with a spreadsheet tacked on. Overall, it seems to be fairly strong in both data management and word processing, and is a strong all-round performer.

YOUR COMPUTER DEC 84.

Framework is an excellent all-round product with few weaknesses. It offers true integration and tremendous versatility. If you are looking for a good, flexible, all-round package, then it is hard to go past this one.

TODAY'S COMPUTERS MAY 85.

Framework enables users to “think on the run,” to formulate disparate ideas and then arrange them logically. The program uses logical steps or “frames.” A frame can be a single word or number, a paragraph of text, a complex unit of information, or a completed spreadsheet. Framework is an excellent program.

AUSTRALIAN BUSINESS APRIL 3, 1985.

Digital Research are all hoping to be sucked.

Don't believe analyses which line them up like boxers in a ring, with Digital Research on the side of AST/Ashton-Tate/Rampage, and Microsoft, Lotus and Intel on the other.

Microsoft has said it will support the Lotus/Intel board — but not to the exclusion of anything else. And Digital Research is not alone in believing that the Rampage standard makes more sense.

What makes analysis hard is the secrecy inside IBM.

Next year, Microsoft is going to launch DOS 5.0. Everyone says that this will sort out the memory problem with the 80286 chip — the one inside the PC/AT, the DeskPro 286, and so on. At last, we can have 16Mbytes.

So, since today we have DOS 3.1, what happened to DOS 4.0?

That is coming out in 1987, say my sources. It will extend memory to 1Mbyte, not just the 640k you get on a PC today.

Inside Microsoft, sources tell me that they don't yet know what DOS 5.0 is going to have. Ben Rosen (chairman of Compaq) on the other hand, seems to expect it by May 1986 or thereabouts.

By my sources inside Microsoft say that they really don't see how DOS 5.0 can be ready before January 87. It isn't even in test yet, they say — so how can it be ready in May?

And, more to the point, they hint that they won't know what's to be in those versions until, well, certain hardware criteria are settled.

That means, to my uneducated mind, that IBM is finalising a new machine for DOS 5.0 and another new machine for DOS 4.0.

It fits. Word is that IBM is

working on a machine with the 80186, and word is equally that IBM is working on a machine with the 80286, as central chips. It could be that there will be two machines: one a go-very-fast PC/XT, with the 186 and DOS 4.0; and the other a go-very-big multi-user machine, compatible with Xenix at program call level due to DOS 5.0.

That is the only other thing we know about DOS 5.0, by the way — that it will be Xenix V compatible.

That may be all cuckoo spit, but the alternative is that Microsoft and IBM have taken leave of all their senses, and intend the Rampage/Above board farce to continue. That's possible, too.

Guy Kewney

Osborne Computer Corp, Colby Computer and Sona Computer, have agreed to join forces to market a range of CP/M, MS-DOS and Macintosh products.

The most interesting result of this is the imminent release of one of these products — a Mac-copy — in Australia from Pacific Data Corp. Never heard of PDC? Well, it's the newly formed group title of Osborne Australia.

As well as the Macintosh work-alike, a range of other Mac products are also set to be released by PDC over the next few months. Call (02) 290 1122 for more details.

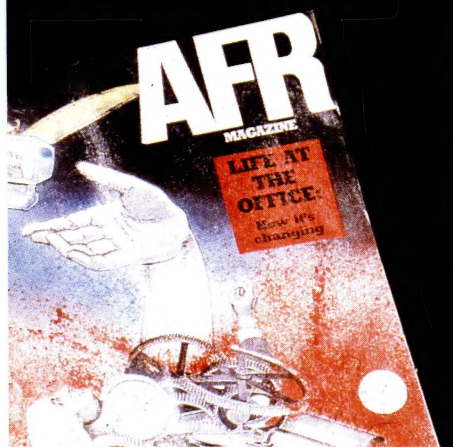
PC compatibles slashed

The \$1,000 price barrier has been broken in the IBM PC-compatible stakes. Dick Smith, in clearing out its

Mac-Copy

Three US companies,

common?



Framework is now even better.

Framework II contains a larger, faster and more powerful spreadsheet. It includes an advanced word processor with 80,000 word speller checker, visible page breaks and built-in mailmerge.

These two primary functions are supported by fully-integrated telecommunications, database, outlining and colour graphics. In fact, all the features are tightly integrated with common syntax and keystrokes, eg. the spelling checker works on spreadsheets as simply as it does on text.

Framework II works on the IBM PC, XT, AT or close compatibles. It can take advantage of memory sizes greater than 640K.

So if you only buy one software package, make it Framework II.

For more information contact any leading computer dealer or the Master Distributor.

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Framework offers windowing so that the integrated word processing, spreadsheet, graphics, database management and communications can be displayed on the screen simultaneously. There is a common command set for all applications and a frames editor for applications development.

AFR MAGAZINE SEPT 4, 1985.

remaining stocks of the Challenger (Benchtested May '84 APC), has offered the machines for sale at \$999. No monitor is included in the price, but you do get two floppy disk drives, either 128k or 256k of RAM (apparently it's a bit like a lucky dip) and the Perfect integrated package as well as Basic.

This is to make way for its new Multitech, another PC-compatible, which is priced at \$1395 including a word-processor and integrated (spreadsheet, database and wordprocessor) package, but excluding monitor.

Tandy and Commodore have also dropped their asking prices. Tandy now sells the Model 1000 for \$1,799 including monitor but no packaged software and Commodore's PC (Benchtested May '85 APC) has been dropped to \$1,999 excluding both monitor and software.

This gap between the cost of home and small business machine is narrowing quickly.

Living in the past

Two slightly greying men called round to see me last month with two databases. One was Ben Rosen, immensely famous in the States as the chairman of Compaq, the launcher of Lotus, and a venture capitalist who used to write the best-read newsletter in the business, the *Morgan Stanley Electronics Newsletter*.

The other was a lesser light, whose name I have to keep secret until he says I can talk about it. He's American too, as it happens.

Both products impressed me enormously, and simultaneously depressed me.

The Rosen database is called Paradox. There is no question in my mind but that it's revolutionary in giving database power to the all-by-myself user. It's

designed for the Lotus 1-2-3 user, who will instantly recognise its tables, rows and columns. And even for a non-spreadsheet person like me, it looks full of ripe, easy data for the plucking.

Datafit, by contrast, looks like a professional's tool. How nice it would be, after one more call from the chief assistant to the assistant chief accountant to 'just help me sort out this little dBaseIII program I've been writing, 'to be able to sit down with Datafit, and, smiling shyly, say: 'Let's talk a bit about what sort of data you're holding,' and draw a little diagram. And after 10 minutes or so, you read the names off the diagram into the program, and have almost solved the problem.

Both programs go a good

long way towards solving one of the biggest database problems — how to get the data in there in the first place.

The trouble is that both assume that data is organised, structured, the way it is when you get data from a Lotus 1-2-3 file, or a dBase file, or something like that. Yet most data that appears on the screen of a computer isn't structured like that at all, and what would be nice would be a background solution.

The problem is simple: most computer users aren't free to spend time copying data into their databases from their text files. It's all there, of course — notes, phone numbers, addresses, references — but while the relationship between factors may be obvious when you

type a letter, six months later, it can get a bit obscure, looking through a list of eight-character file names.

The idea would be that, while you are typing away on the word processor, or receiving data from Minerva, you can mark bits of information for storage. A background program could be written on a modern micro, which would monitor the flow of information, receive marked items for the foreground job, and occasionally interrupt to expose ambiguity.

The trouble is that most micros in use today aren't modern micros, but Apple IIs and IBM PCs.

The market has slowed down because these machines are holding it back. People want more powerful machines this year than last year. Last year's micro, as you can quickly see from adverts in this magazine, is an IBM PC with an 8088 and 256k of RAM and two disks. You can get it for well under \$2,000 these days, including display.

Perhaps you doubt that things are that bad? Try counting chips.

When CP/M was first accepted as the standard of its day, home micros had around 1k to 16k of memory. CP/M, being a 'business' system, assumed 64k. You couldn't put more in because the chip wouldn't handle it.

We used chips with 4k bits in those days. Eight chips gave 4k. To get 64k you had a memory board with 16 rows of eight. That's 128 chips.

Today, we have chips with 256k bits for the same price as those 4k bit RAMs. Eight chips is 256k (well, nine, for parity). A megabyte takes 32 chips. Plug in 128 chips, and you'd have four megabytes.

No IBM PC can handle more than 640k. The processor chip is out of data, and runs out of numbers at one megabyte, with PC-DOS ignoring the last 360k. The



This magazine's initials seem to be the 'in thing' when it comes to naming PCs. First NEC, and now Wang has produced an 'APC'.

Wang's 'Advanced Personal Computer' is an IBM PC/XT/AT compatible based on the 80286 processor and running either MS-DOS or Xenix. Existing Wang Professional Computer owners can upgrade by exchanging the main system board.

Of course Wang claims (as do virtually all PC/AT compatible manufacturers) that its APC "outperforms its PC rivals in speed, information handling capability, storage capacity and power"; but the company's main angle would appear to be its intention to port multi-user business software currently running on its 2200 range of computers to the multi-user (up to four) Xenix-equipped APC.

Obviously there are many APC configurations and prices, but to give you an idea of one configuration: \$10,500 will buy a 512k RAM machine with screen, a 1.2Mb floppy drive and 20Mb hard disk.

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- Built-in Centronics printer interface
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- Built-in Joystick interfaces (2)
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- Built-in color/monochrome monitor interface
- Built-in transformer/regulator
- Built-in expansion slots 2
- Built-in for expansion to MSX 2

In addition, the MSX[®] 2 gives you a real-time clock, for handy reference. And there's a sophisticated digitising feature that lets you put images from photos or from TV into your computer by using a digitising adaptor. Once the desired images are computerised, they can be combined with screen generated graphics. So you can superimpose charts, graphs and text on photos and famous scenes.



The ones with everything built-in

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welcome

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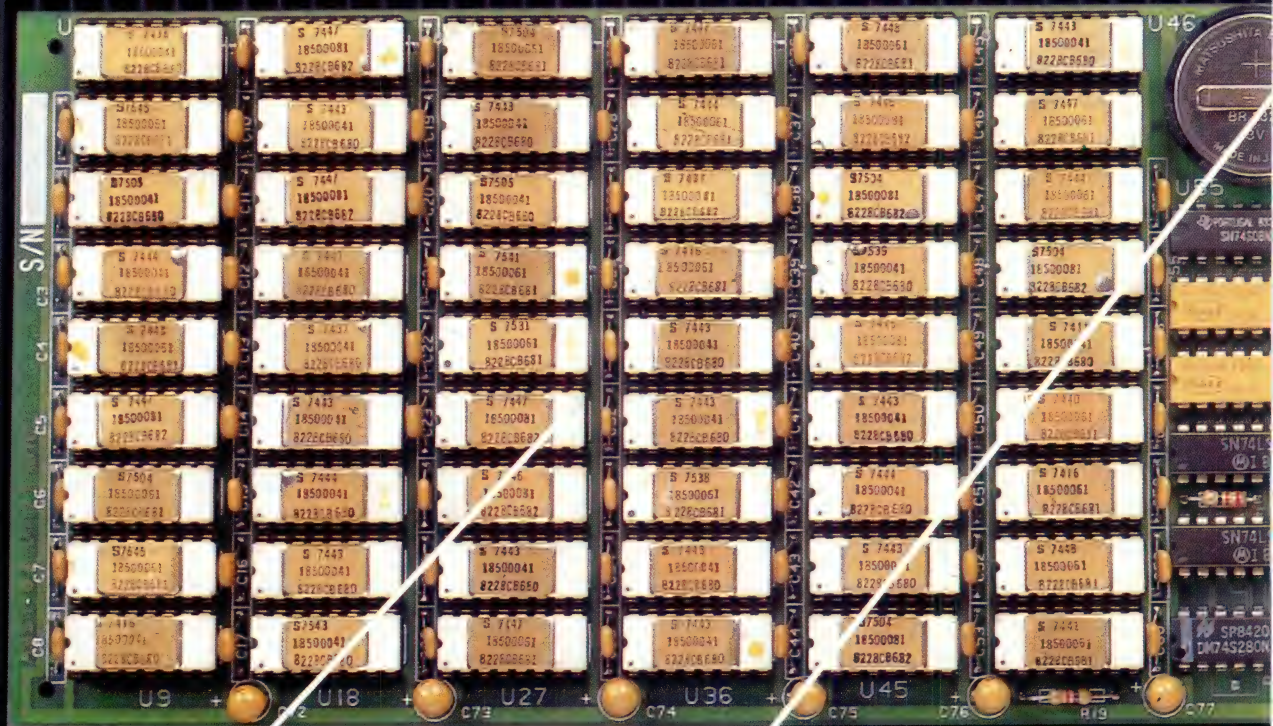
6PAK PLUSTM QUBIE

By **QUBIE**

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N.S.W. 2223 Australia
Telephone: (02) 579 3322

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California 93010 U.S.A.
Tempo House, 15 Falcon Road, London
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ACTUAL SIZE



384K MEMORY EXPANSION

Socketed and expandable to 384K. Your 6PakPlusTM comes standard with 64K memory. 384K on the 6PakPlusTM added to 256K on the PC system board provides for the maximum addressable user memory.

CLOCK/CALENDAR

6PakPlusTM eliminates the need to manually input the date on system start-up. The chronograph is fully compatible with all PC-DOS software routines which utilize clock functions. Battery backup power supply keeps the clock running at all times.

PARALLEL PRINTER PORT

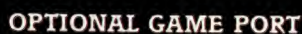
Interface the PC to most printers or other parallel devices. The parallel port can be addressed as LPT1 or LPT2. Internal cable and DB25 connector are all included.

6PakPlus[™] is a powerful multifunction enhancement for PC or PC-compatible machines. With Qubie's flexible configurations, all the PC's capacity can be utilized. It's totally compatible

with IBM hardware, operating systems and languages. The board can be inserted into any free slot and it even includes a card edge guide for secure mounting.

With 6PakPlus™ you receive extensive software at no extra cost. Electronic disk caching and printer buffering are all part of the 6PakPlus™ package.

Good service starts with local support
and local supplies of product.



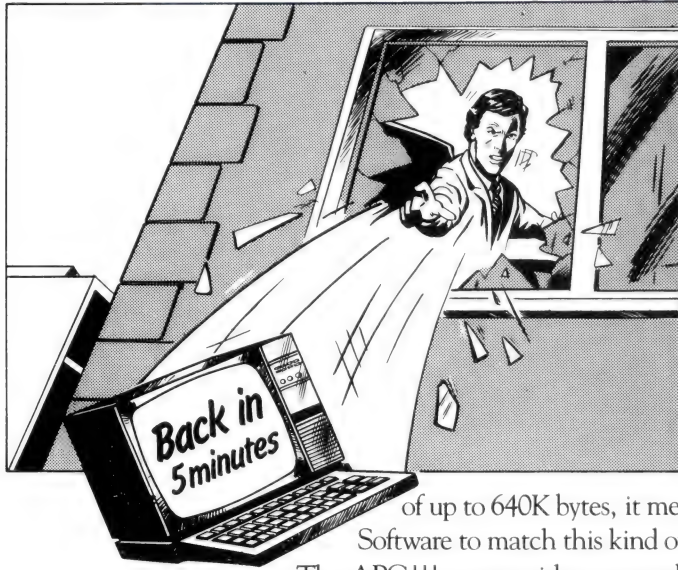
Game adapter port which can be used with all IBM-compatible joysticks or game paddles.

Serial port can be used to connect the PC to letter quality printers, plotters, modems, or other devices which use an RS-232C interface. Switches allow the port to be configured as COM1 or COM2.

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Getting migraines waiting for the answer?



Are you the kind of person who wants answers in a split second?

In today's helter-skelter business world you can't afford to wait for a moment. If waiting has been one of your biggest headaches, relief is now at hand.

The solution?

Just take APC III. (Advanced Personal Computer.)

It is quite simply one of the most complete personal computers in the world. With a price tag for the basic single disk system hardware of less than \$3000.

And the hardware is no slouch.

It gives you ultra-high operating speed, with true 16 bit processing performance at 8MHz. (For the non technically minded, that's very fast.) With its massive memory capacity

of up to 640K bytes, it means your processing headaches can be solved in micro seconds.

Software to match this kind of performance is not a headache either.

The APC III comes with a comprehensive collection of leadership software for each business application. From word processing to finance. Accounting to integrated packages. MS-DOS and UNIX systems are supported to give you even less headaches.

And with every machine you get a company as well, NEC, Japan's largest maker of personal computers. The company that took out the coveted 1983 Computer of the Year Award. So you get things like an extension of the normal 90 day warranty to a full 12 months free maintenance if you want it. And a tollfree Hotline service that has an expert on the other end of the phoneline anytime you need a niggling problem solved. Just ask your NEC dealer for details.

To find out more just write or phone us now.

There are enough headaches in life to cope with, without purchasing one. Take an APC III instead.

NEC

Please send me more details on the new APC III.

Name Title

Company

Address

Postcode

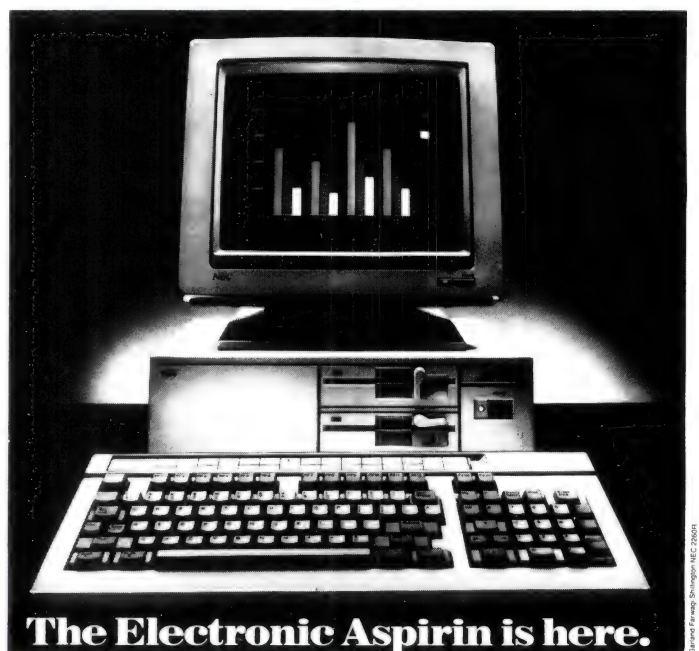
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(02) 671-6951 — 621-4242 P.O. Box 62, BLACKTOWN, 2148
202 Sunnyholt Road, corner Vardys Rd, Blacktown, NSW 2148.

Take APC III



The Electronic Aspirin is here.

more modern 80286 chip can, theoretically, handle 16Mbytes. By mid-1986, when the megabit RAM chip is in production, that would take up our 128 chips almost exactly — but what would be the use? PC-DOS still can't count that far.

I had lunch recently with a senior Apple executive and I was talking about my 'wish list' for the Macintosh. He hinted broadly that an enormous Mac would be on the cards for 1986 — 'perhaps a megabyte — but I'm telling them to think big and go for a 2Mbyte Mac.' Wow!

Software evolves clumsily at first. Typically, someone takes advantage of a new, big machine, to produce something enormous, slow and unreliable — but something never tried before. For instance, windows, icons, mouse; for instance, 'pop-up' software; for instance, 'integrated' software; or CAD graphics. And then clever software people try (to prove their own brilliance) to cram a similar idea into smaller, older machines. And then, the same space-cramming tricks are used on the bigger machines, and we end up with something really new.

With the hardware industry complacently milking the IBM PC for more than it's worth (see IBM's end-of-year clearance sales for evidence) it's really no wonder that the software of the future remains unwritten.

Guy Kewney

Dick Smith's Flying Duck

Commodore has accused Dick Smith Electronics of selling "flying duck super specials". That's the description of Taiwanese products offered by Commodore in announcing price cuts to its German-made PC. But there's still \$600 difference between the competitors'

prices (in DSE's favour, and excluding any account of DSE's bundled software), so we reckon the comment is probably a result of sour grapes.

Briefs

Microsoft will sponsor a compact disk — ROM conference from March 3 to 6 in Seattle. Chairman of Microsoft, Bill Gates, said it was time for Microsoft to bring together the leaders in this rapidly emerging field of technology. "This conference will serve as a 'catalyst for integrating CD-ROM technology into personal computers,'" he said.

Conference attendance cost is seven hundred and ninety nine tax deductible US dollars. Call Lee McLean on (02) 27 3571 for more details... Technology Corporation of Australia (formerly known as Interfaceware) is the latest in a long list of micro companies offering themselves to the public. Stock market approval for the flotation has been received for 2.8 million shares at fifty cents each. This represents just under half of the company... Users wanting to run Cobol on a PC network should call (03) 699 4511 for details of 'Austec's Commercial Environment'. It has recently been ported from Unix to MS-DOS, Xenix and IBM's Networking DOS 3.1... "As one part of a plan to further revitalise its business, ICL Australia today announced it is retrenching 75 staff" began ICL's statement on the sackings. Watch for a test of the (now trimmer) company's new multi-user micro next issue... The first automated bulletin board on Viatel is causing its operators some concern. A core of trouble-makers is taking delight in outwitting the built-in 'dirty words editor'. Quite why such a trivial task is providing such stimulation is beyond us. Tune in to Microtex on page 666, if

you'd like to know who they are... Barson Computers and Centrelease have entered into a joint venture to provide a rental scheme for Barson's products. It is expected most trade will come from the education and business markets... Melbourne PC dealer

Computers Galore has admitted selling pirated copies of AutoCad software. It has agreed to pay an undisclosed amount to Autodesk Inc. (a Californian-based firm and copyright holder of AutoCad) and Entercom, AutoCad's Australian distributor...

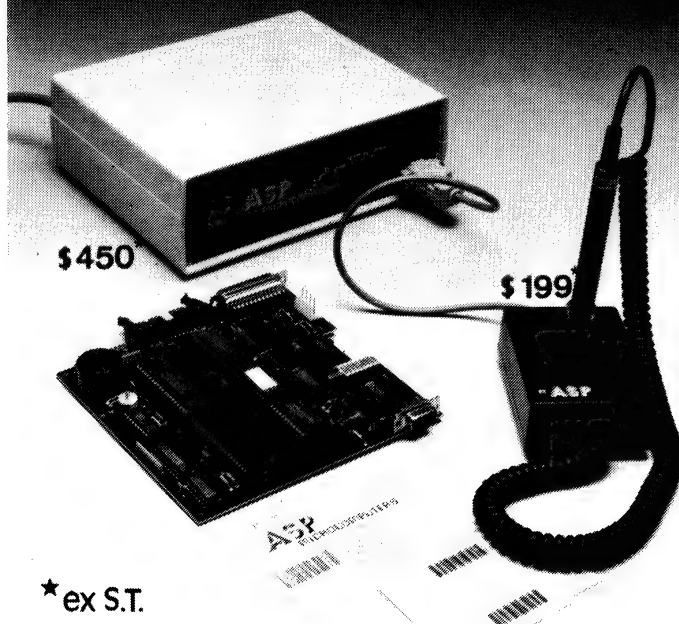


'I've been replaced by a floppy disk!'

BARCODE

READER / LABEL PRINTER - & WANDS

ASP Microcomputers (03) 5000628



*ex S.T.

Report from Comdex, Las Vegas November 1985

Loss of confidence in the micro industry cast a shadow over the seventh annual Computer Dealers' Exposition and Conference — Comdex/Fall 85 — when it opened its doors in Las Vegas on 20 November. The number of exhibitors was down from last year's record, the number of visitors was down, and the main conference speech was called 'Surviving the Industry Downturn'. But there were still 1200 stands, 80,000 attendees, and hundreds of new products. Peter Jackson picks out the big stories, with a full report to come next month.

Ashton-Tate sets the network trend

On the opening day, Ashton-Tate set a trend with the launch of dBaseIII Plus; not with the enhancements to the existing database, but by offering local area network support.

Suddenly networks are fashionable again, following IBM's statements of what it intends to do with basaband, broadband, and token rings, and Ashton-Tate intends to keep in fashion.

Although dBaseIII Plus and the associated LAN Pack product currently support networks running under PC-DOS 3.1, Ashton-Tate president Ed Esber says that his company will support any and all networking systems including token ring and star configurations, as long as the users want them.

The \$US695 dBaseIII Plus succeeds the original version, and network support is built-in, even in its single-user form. When a

network is installed, users can take advantage of it by buying more copies of dBaseIII Plus for each node, or by paying \$US995 for a LAN Pack that lets three more users share the original copy over the net.

A new menu-driven front-end called The Assistant now shields new users from dBase's notorious dot prompt, while a screen-building utility called Screen Painter and 50 enhancements to the dBase programming language help to set up custom applications. Ashton-Tate also claims that the Plus version needs less memory (256k minimum), sorts up to twice as fast, can import data from more applications, and is fully compatible with dBaseIII.

But if Ashton-Tate delivered the first blow, other major software publishers were also giving debuts to networking applications. Old-stager Micro-Pro launched an enhanced Release 2 of WordStar 2000 at the show, capable of running on three networks including 3Com's Ethernet, while Microsoft demonstrated a networking version of Word on its stand. And Kansas City-based Innovative Software also chose the show to preview a network version of its highly-rated Smart suite. According to Innovative's president Mike Brown, his word processing, database and spreadsheet packages will be running on all PC-DOS 3.1 networks by the first quarter of next year and cost \$US1795 all-in for three users. Extra users will cost \$US595 each.

Lower down the software levels, all of this is good

news for Novell. Its NetWare networking system for PC-DOS 3.1 has just been bought in by IBM as a stop-gap to cover acknowledged problems with IBM's own PC Network product. All the new networking applications will run happily on top of NetWare.

Pick a card, any card

If there were a Comdex trend in adds-ons — apart from the obvious one that all roads lead to the IBM PC — it was disk cards.

Plus Development started the trend with the HardCard, a 10Mbyte, 3½in Winchester disk drive built onto a standard PC add-on board and announced some months back. But by the time Comdex opened for business, the bandwagon was rolling.

Western Digital, noted hitherto only for making high-performance disk controller chips and boards, chose to enter the retail market at the show with FileCard, a 10Mbyte drive mounted — you guessed it — on a plug-in PC card. But like all successful workalike companies, Western Digital had enhanced the original idea by adding a piggy-back board, adding an extra 512k RAM to the FileCard. According to the company's marketing director Bruce Friesen, FileCard will sell for \$US1095 including the depopulated piggy-back board. 'We will be announcing additional solutions in 1986,' he said, refusing to be drawn on what the extras might be.

Mountain Computer also enhanced Plus' original, launching the DriveCard with a 20Mbyte Winchester onboard for \$US1195, while Tandon chipped in with a similar 20Mbyte version called Diskcard.

All these manufacturers were pushing ease of installation in IBM PCs and compatibles, and easy removal for data transfer from one machine to another. But for competitive

edges they were reduced to vying with each other over the number of slots the boards take up — either one or one-and-a-half — and over power consumption in overburdened machines.

Las Vegas' top strip act

One new product that will, paradoxically, be visible in Australia before it can be used is Cauzin's Softstrip. The Softstrip is a kind of super-bar code for transferring programs and data on paper rather than magnetic media, and inventor Cauzin Systems has signed up major US computer magazines and textbook publishers who will be publishing programs in Softstrip format.

From January onwards, open a copy of *Byte*, *A+*, *PC*, *Nibble* or *Family Computing*, or a textbook from Addison-Wesley or John Wiley, and each program listing will be accompanied by a Softstrip.

To read the strips you need a \$290 Cauzin reader and the appropriate software for your machine. The reader drives its own infrared sensing head along the strip and absorbs the data, whatever it is. Cauzin was demonstrating the reader data directly into Lotus 1-2-3, and also reading Basic games programs into an Apple IIe.

Copy protection? Just stamp or write across the strip in red ink. The reader looks straight through red, but on a photocopy that shows up black.

Cauzin is backed financially by Eastman Kodak and Xerox, among others. And Kodak has linked with Cauzin to form a joint venture called Softstrip International, which will market the reader as well as Softstrip programs — called Strip Ware — outside the US and Canada.



The Prince of PCs stages another coup...

You now have even more reason to buy the finest personal computer on the market – the NEC APC III.

SLE Card for unmatched software range.

The new SLE (Software Library Expander) card enables the NEC to run the world's broadest range of software. Run all the most popular industry standard packages. Lotus, Symphony, dBase III, Multimate and Crosstalk, just for starters. In most cases, they run faster than on "industry standard" PCs.

Other features include:

- ☒ Memory expansion to 640K
- ☒ High resolution in colour or monochrome
- ☒ Calendar/clock
- ☒ Maximum of 2 RS-232 ports
- ☒ Parallel port
- ☒ Optional 8087 maths co-processor

Stocks are limited so call now to avoid disappointment.

SLE Board and software \$550.00

Reduced Prices on Hard Disks

We are now able to offer unmatched low pricing on hard disk versions of the APC-III. Plus a new high speed 20 Meg hard disk. All hard disks are manufactured by NEC. They offer superior speed and reliability. Do not compare them with brands being fitted on other PCs!

New pricing on APC-III hard disk computers:

1 x 720K floppy plus 1 x 10 Meg (Monochrome) **\$4795.00**

1 x 720K floppy plus 1 x 20 Meg (Monochrome) **\$5195.00**

For colour add \$700.00

Memory Expansion to 640K

We now have a brilliant new 512K

memory board. Expand the APC-III to its full 640K with just one card.

512K memory card \$695.00

High speed networking for APC-III

The Novell Netware/O system is now available for the APC-III.

- ☒ Up to 16 APC-IIIs can be networked together, with one machine acting as a file server and print sharer for all machines.
- ☒ A high speed common bus allows sharing of files and peripherals.
- ☒ Printers may be connected to workstations or accessed via the file server. Two printers may be connected to the file sharer. Sophisticated print queuing is provided.
- ☒ No disk partitions are necessary. All files and directories are shared subject to password protection.

In Sydney:

Natwick Management

Suite 2, 25 Burns Bay Road
Lane Cove, NSW, Phone (02) 428 1666

In Melbourne:

Bayside Computer Systems

Suite 1, Cnr. Skye Road and Farrell St.
Frankston. Phone (03) 781 4011

NEC

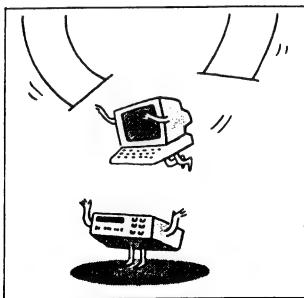
APC III

ADVANCED PERSONAL COMPUTER III

VCR data storage

If you think your videocassette recorder is good only for watching classics from the silver screen or taping less-than-classics from TV, think again. Alpha Microsystems of California has developed a way for VCRs to make backup copies of data stored on a PC's hard disk.

Alpha Micro's solution is an \$1,100 printed circuit board that fits into any IBM or IBM-compatible PC and can feed data to any standard VHS or Beta format machine. Standard videocassettes can be used to hold up to 80Mb — about four times what most PC hard disks hold. Best of all, the VCR can be set to record data automatically — the same as it does with a TV show.



China's 'Great Wall' enters the PC competition

Visitors at Comdex, the huge computer-industry trade show staged in Las Vegas in November, may not have given a second glance to the out-of-the-way booth exhibiting yet another IBM PC-clone. But this new model was different. Called the Great Wall Personal Computer, it is China's first foray into U.S. computer capitalism.

Designed and built in Beijing out of Japanese, South Korean, and U.S. components, the machine is expected to be available in the U.S. next year. Sales are already brisk in Singapore and Hong Kong, where customers like the special software that enables it to work in both Mandarin Chinese and English. Its U.S. importer, China United Trading Corp. of New York, expects the dual-language feature to be popular at Chinese newspapers. China United also cites some very familiar features: Benyuan Qian, general manager of its electronics division, says the machine is "more powerful" than IBM's PC-XT, "and will cost less, too."

Why Ed Farris loves computer funerals

Edward Farris, president and founder of EF Industries, loves to read about computer companies in trouble. That's because his Hawthorne (California) computer-services firm has entered a lucrative market niche: servicing computer gear bought from manufacturers that either abandoned their products or went out of business. "We're an orphanage," says Farris. Since 1980 he's been acquiring entire companies or discontinued product lines from the likes of Cipher Data Products and Caelus. Last year he earned \$1.2 million on sales of \$12 million.

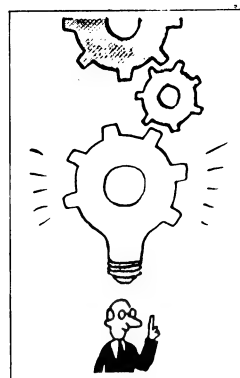
EF is one of the few havens around for customers stuck with discontinued computer products. And they must pay dearly for the service. Thorn EMI Screen Entertainment Inc., a Los Angeles movie company, pays EF some \$8,000 a year to maintain three small computer systems abandoned by Scientific Data Systems. Thorn's only other options were to replace its \$85,000 investment or hire an

independent technician. Of course, Ferris knows that discontinued products eventually become obsolete. As a result, he's assembled a \$20 million kitty and is always on the prowl for new lines to service. Given the current shakeout, he shouldn't lack for new opportunities.

Xerox has an idea for selling ideas

Xerox's 15-year-old Palo Alto Research Center (PARC) has come up with some of Silicon Valley's hottest technological innovations. But many never saw the light of day, while others just bombed as Xerox products. The easy-to-use Star workstation, for example, was a marketplace loser because of its high cost and slow speed. It took Apple to make the Star's technology a commercial success — in its Macintosh.

Now, after bearing endless criticism for squandering its technological wealth, Xerox may have found a better way to profit from its research. Its in-house Technology Innovation Board, headed by William J. Spencer, former head of PARC and now Xerox senior vice-president for research, has recommended that Xerox back startups that will bring PARC innovations to market more effectively. In exchange for technology licenses and some financing, Xerox will get an equity position. The first such venture: Astra Communications Inc, which will develop ways to make Xerox's Ethernet network more versatile.



'Crashless' supercomputers

Tomorrow's supercomputers will consist of several processing units, perhaps even thousands. Almost everyone agrees on that. But there is little agreement on how to prevent these systems from "crashing" when two or more processors battle to use the same section of memory at the same time. A small band at Sullivan Computer Corp. are rushing to put the finishing touches on a new supercomputer, slated for unveiling in about 12 months, that is engineered to avoid such internal conflicts.

The new supercomputer will leapfrog the fastest machine now available by at least 10 times, claims President Herbert Sullivan. In some applications it could be 100 times faster. The key is a unique memory "architecture" developed at Columbia University and Chopp Computer Corp. It is totally random. Data are not stored in specified memory locations. Instead, they get slapped into the first available spot the computer finds, along with a tag that describes the contents. So, if there is a traffic jam in one part of the memory, the computer simply skips to someplace else. The fundamentals of this approach are also being incorporated into the Ultracomputer that New York University is now building.



Amstrad PCW 8256

Sets new horizons in personal computing and word processing.

Everything about the new Amstrad PCW 8256 has been designed to simplify and speed up personal and business computing and word processing.

The screen has 40% more usable display area than even an IBM PC.† The keyboard has keys specifically dedicated to word processing functions. The computer is fully programmable to make CP/M* software such as spreadsheets, databases and communications easier than ever to use. The printer has a self-loading mechanism for single sheet use and a tractor mechanism for continuous feed stationery. And the convenient 3" discs are supplied in tough, protective cases to withstand business wear and tear.

A complete business package for under \$1500

The Amstrad PCW 8256 is a complete business package which includes:

- High resolution green screen monitor.
- Built in disc drive.
- 82 key keyboard.
- 256K RAM Computer.
- LocoScript wordprocessing built in.
- Fully integrated printer with numerous high speed draft and letter quality options.
- CP/M Plus* with GSX and Dr LOGO.
- Additional microprocessors for keyboard and printer control.
- Mallard BASIC with Jetsam.
- Expansion capability.



The built-in LocoScript word processing software is amongst the most powerful available and includes such features as pagination, simultaneous editing and printing, automatic paragraph realignment, automatic document editing and reforming and simple cut & paste editing.

The CP/M Plus* operating system gives you access to over 8,000 commercial applications programs, and with the Basic, Dr LOGO and GSX Graphics Extension programs supplied, you can explore the full capabilities of microcomputing and even experiment with writing your own programs.

You can prepare sales forecasts. Perform "what if" calculations on budgets and cashflow projections. Sort database records. Teach yourself to type. Or use Amsoft's fully integrated ABC accounts system to keep track of invoices, stock and debtors (requires additional disc drive unit).

The printer provides a choice of letter or draft quality, with built-in features such as pitch, italics, bold face, underline, super

and sub script. And, with its optional serial interface, the whole system becomes a versatile and very cost effective "intelligent" terminal on mainframe installations, either by direct connection or via a modem.

The Amstrad PCW 8256 is a complete business package at a breakthrough price, distributed and guaranteed throughout Australia by AWA-Thorn. Ask for a demonstration at leading computer shops and department stores today, or post the coupon below for further information.

AMSTRAD

TPB/679

Post to: AWA-Thorn Consumer Products Pty. Ltd.
348 Victoria Road, Rydalmere, NSW 2116.

Please forward information on the Amstrad PCW 8256 personal computer and word processor.

Name: _____

Address: _____

Postcode: _____

AWA-THORN
Broadening your horizons

*Registered Trade Mark of Digital Research
†IBM PC is a registered Trade Mark of IBM Inc.



Fortunes in the US computer magazine industry have hit an all-time low. Our US correspondent gives his view on what went wrong, and presents the latest news on American hardware and software releases.

The bottom line

Creative Computing, the first personal computing magazine in the world (November 1974), was killed by its parent company, Ziff-Davis, effective with the December 1985 issue. *Creative* isn't the first magazine to disappear, and it certainly won't be the last. In a sense, the demise of various computer magazines reflects what is happening to the computer industry as a whole. Let's look at some of these trends.

(1) More sophisticated customers. In the broadest sense, the market can be divided into two areas: people who have computers, and those who don't. Those who do have computers tend to be technically knowledgeable when they shop for peripherals, software and additional computers. When they shop for replacements for their current machines, they are looking for a certain amount of compatibility — particularly if they have a large investment in data files.

On the other hand, people who don't have computers are looking for user-friendliness of a kind that just isn't available today. As a result of being confronted with machines that manufacturers are calling user-friendly but in reality are user-hostile, new customers are staying away from computers in droves. The current market is therefore largely composed of people who have computers and who are much smarter the second and third time around. Many companies with marginal products are going out of business, and new companies with average products aren't even getting to first base.

(2) Enormous cost of entry. To introduce a new product today costs several orders of magnitude more than it did four or five years ago. Xanaro reportedly is spending \$4 million on a marketing campaign to introduce Ability, an integrated software package. Sevin-Rosen reportedly invested \$8

million in Ansa, developer of Paradox, a database package. This is more than 10 times the amount the company invested in Lotus a few years ago, which was, in turn, 10 times more than the makers of VisiCalc started with in 1978.

IBM's advertising budget is about \$550 million; Apple's is \$175 million; and eight other companies in the field have ad budgets of more than \$40 million per year. For a new company to challenge the leaders, it must seek financing far in excess of what the average venture capital firm is willing or able to invest.

(3) Confused marketing. Some companies pack ads with mind-numbing technical jargon. Others stress product benefits, while still others flirt with vague image-building approaches. Bad as these confused advertising approaches are, it is in media buying (where the ad appears — TV, magazines, newspapers) that confusion is rampant.

Typically, media placement decisions in an ad agency are made by a junior person, and sometimes by a computer. Conventional wisdom says that ads should be placed in publications with the lowest page cost per thousand readers. Very little, if any, attention is paid to the content of the publication or, even worse, whether or not the ad actually sells. And follow-up studies are virtually unknown.

(4) Self-fulfilling prophecies. Given the dearth of decent research, manufacturers and investors, even customers, have come to rely upon the general business press to an unprecedented extent for information about the computer industry. The *Wall Street Journal*, the *New York Times*, *Fortune*, *Business Week*, and other similar publications are in the position of not just reporting the news, but actually defining the industry.

Consequently, reporters with very tight deadlines and alarmingly little inclination to understand technical products and users are largely calling the shots. If the *Times* talks about chequebook balancing and

recipe files in a piece about the home market, managers and investors believe it. As a result of this erroneous image created by the press, most companies don't take the home market seriously, ignoring the reality that most home users are a well-healed lot who do much the same things with their home computers that business users do — word processing, database management, analysis with spreadsheets, and programming.

Combine all these things — increasingly sophisticated customers, confused marketing, the high cost of entry, and lack of research, and it is not difficult to understand why the industry is tripping over its own feet. Other important factors include the enormous might of IBM, desperation tactics of companies (and magazines) on the rocks, periodic price wars, and a naive belief on the part of many managers that their products really are user-friendly.

My prediction is that the industry is unlikely to emerge from the doldrums for several years, but when it does it will be more knowledgeable, more secure, and better able to take the strikes necessary to grow in our increasingly information-oriented society.

Compatible kits

Heath has announced two kits — the HF-148, a compact portable computer, and the HF-158, a desk-top unit, that are apparently fully compatible with the IBM PC. The Heath units run at a clock speed of 8MHz, compared to the 4.77MHz speed of the IBM PC. Output is provided for both composite monochrome and RGB colour video monitors. The units have 256k of RAM built in and use 256k chips, so memory can be expanded to 640k without the need for additional boards.

The redesigned keyboard features an enlarged L-shaped Return key and a double-wide Shift key at the standard typewriter positions. The units are available with one or two

floppy disk drives; an optional 10 or 20Mbyte Winchester drive is available for the desk-top unit as well.

Random bits

Two companies have recently introduced computerised versions of *The Bible*. Bible Research Systems has released THE WORD processor, containing the entire text of *The Bible* (King James and New International versions) along with a family of software products that search, cross-reference, display, and print text. It is available for the IBM PC, the Apple II, the Commodore 64, and Tandy and CP/M computers. Midwest Software has released the New Testament (King James version) along with a search and print program... The Software Research Group has introduced a line of brown bag software which really comes in a brown bag. The line includes an integrated word processor/database and a file recovery system... Borland International has unveiled a new RAM-resident software series. Turbo Lightning and the Turbo Lightning Library. Borland calls the package an 'artificially intelligent' software engine that uses ultra-fast look-up procedures and data compression techniques which allow volumes of reference information to be easily stored and accessed... Want to write your own computer game? Try Garry Kitchen's GameMaker: The Computer Game Design Kit from Activision. With its built-in SpriteMaker, SceneMaker, SoundMaker, MusicMaker and Editor, you can create games as professional as many on store shelves today. The package is available for the Apple II and the Commodore 64... Two programmers at AT&T Bell Labs have developed a new computer language, called Squeak, that can be used to program mice and other interface devices. In Squeak, several instructions can be processed simultaneously and events will be properly coordinated.

END

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General description of products to be exhibited

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Sharp PC-7000

Sharp's reputation for building well-produced but rather quirky machines seemed to be recurring, but the PC-7000, an IBM PC compatible luggable, is definitely a step in the direction of compact engineering and speed. Peter Bright conveys his impressions.

When the Sharp PC-7000 arrived in the APC office, it was greeted by almost total apathy from the staff. Badly hidden yawns were the order of the day.

It's true things didn't look good. Sharp has always had a reputation for building technically sound but rather strange micros. The company has been quite content to go along in its own sweet way, happily ignoring 'industry standards'.

The fact that the PC-7000 is an IBM PC compatible and is said to represent a new awakening at Sharp, didn't help my colleagues' attitudes towards the little machine. We've got IBM compatibles coming out of our ears.

However, when I unwrapped the machine and switched it on, people became interested; it looks neat, it has the world's first backlit LCD, and it's fast.

Hardware

The PC-7000 is certainly one of the neatest IBM PC lookalike luggables I've come across so far. The system consists of three main parts: system unit, keyboard and printer (the CE-700P printer is optional). All three units are finished in cream and light grey plastic casings.

When the system is rigged for carrying, both the printer and the keyboard



clip onto the main unit. This combination can then be placed in the custom-designed carrying case, or carried by the handle built into the top of the main unit.

Together, the main unit and the keyboard measure 41cms wide by 16cms deep by 21cms high, and weigh just over 8kg. Considering what is packed inside, this is reasonable and makes the PC-7000 very easy to carry around. Adding the printer increases the depth of the system by just under 8.4cms. More significantly, it adds an extra 5.25kg to the weight, making the unit considerably more difficult to carry. One nice touch is that the hinge of the built-in carrying handle can be moved to compensate for the change in the centre of gravity when the printer is clipped on.

Like most machines of this type, the keyboard clips onto the front of the main casing to protect the screen. In this case, the keyboard is held in place by a couple of lugs and two catches. When the catches are released, you can remove the keyboard and access the main workings of the unit.

Most of the system unit's front panel is occupied by the LCD. To its right is a system status display with LEDs, showing whether the power is on and which disk drive is in use, as well as a backlight message which comes on when the display times out. Under this is a thumbwheel to alter screen contrast, and a concealed lever to alter the screen tilt.



Considering what is packed inside, the PC-7000 is easy to carry.

Running along the base of the front panel is a recess which is designed to hold the keyboard cable when the system is in transit. This has a spring-loaded lid which swings into place whenever you remove the cable.

The front panel looks very good indeed. Everyone who saw the machine commented on how neat it is and the

layout of the status lights, especially, reminded me more of a modern photocopier than a computer. The overall effect is definitely of a piece of office equipment rather than a micro.

Working around the rest of the machine, the right-hand side panel houses twin 5.25in disk drives and a socket for the keyboard. The left-hand



The 84-key keyboard is closer to the layout of the IBM PC/AT rather than the PC, but it still isn't truly compatible.

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side panel holds the on/off switch.

The rear panel is generally neat and uncluttered. As well as a power socket, it accommodates an RS232 serial port and an IBM-style Centronics parallel printer port. The review machine also had the optional colour monitor adaptor fitted, so the rear panel has an IBM RGB monitor socket. The remaining space on the back panel is for the telephone connections for a built-in modem. According to Sharp this will be an Australian manufactured unit, but negotiations with several companies hadn't been completed at press time.

One thing which is missing from the rear panel is any sign of IBM expansion ports. If you want to fit an IBM card, you will have to use the optional expansion box which sits under the main unit. This also holds a custom-designed 3.5in hard disk to make the PC-7000 into a PC/XT lookalike.

Unlike some luggables and most portables, getting inside the PC-7000 is straightforward. Indeed, users are encouraged to fit their own expansion units aided by comprehensive instructions in the manual.

The first step is to remove three Phillips screws on the top of the back panel: the panel then lifts up to reveal the

main PCB and any extras that may have been fitted. Removing an additional three screws allows you to slide the main chassis out of the casing and get at the power supply and disk drives.

The first thing that struck me when I removed the rear cover was how superbly engineered both electronically and mechanically the PC-7000 is. The main PCB measures a miniscule seven inches by eight inches, but manages to achieve more than the IBM PC with its apparent acre of space.

The main PCB is one of the most densely-packed units I can remember seeing; there literally isn't room for another chip on the board. The main processor is an Intel 8086 running at 7.3MHz, and can be slowed by software to 4.7MHz for IBM compatibility. Butting onto the 8086 is a socket for an optional 8087 maths co-processor.

To the left of the main processor is the main RAM. The entry-level machine is supplied with 384k of RAM, of which 64k is reserved for system use; the remaining 320k is available to DOS. Sockets are provided on the main board to take the total RAM up to 704k, giving a usable 640k which is the DOS maximum. All the RAM chips are 256kbit devices arranged in banks of four, giving



The one-unit disk drives

128k per set. To the right of the RAM is 16k of ROM which provides the IBM-compatible BIOS, as well as self-check and the set-up routines.

In its compact dimension, the main PCB also houses the disk controller and RS232 and Centronics drivers. Much of the space-saving is accounted for by two massive surface-soldered square-gate array chips in the top left-hand corner of the PCB.

The review machine was supplied with the optional IBM RGB colour graphics adaptor. The main LCD screen is already colour graphics compatible, so the add-on board just has to drive the IBM CRT screen.

Behind the main PCB, hidden away inside the main chassis, are the power supply unit and the disk drives. The power supply also incorporates a small but incredibly noisy fan. Judging by the sound of the fan, the power supply is only just up to the job, as each time the screen backlight was turned on or the disk drive was accessed, the fan slowed audibly.

The disk drives are of a very compact size. Externally they resemble two half-height 5.25in 360k IBM PC compatible drives, but closer examination showed that instead of being two disk drives bolted together, they are all one unit. Although there are two drive mechanisms, they are both bolted onto the one chassis and are both controlled by one controller board. This is the first time I've seen this, but it certainly makes sense in terms of space saving. (The drives, incidentally, are made by Canon.)

The main display on the PC-7000 is an 80-column by 25-line IBM colour graphics adaptor compatible LCD,



All ports for all sorts, but no IBM expansion ports



The optional CE-700P thermal printer clips onto the back of the main unit

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Retrace Time (H x V):	0.5Ms x 0.4msec
Resolution:	640 x 200 lines
Input Terminals:	9 pin 'D' type connector
Dimensions:	11"(H) x 15"(W) x 13"(D) 266(H) x 367(W) x 318(D)mm
Shipping Weight:	15.9kg



Model HR31 200



Models HR 39 & HR 134

Technical Data - HR 39 & HR 134

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mounted in the front panel of the main unit. By pressing a lever on the front panel, the display hinges forward on a smooth-running, silicon-dampened mechanism, which allows you to alter the angle of the display to suit yourself. The contrast of the LCD can also be altered by turning a thumbwheel on the front panel.

The main trouble with LCD displays in the past has been that they can be very difficult to read. The main reason for this is that unlike conventional CRT devices, LCDs simply reflect light, they don't glow like a conventional screen.

The PC-7000 is the first production machine I have seen that overcomes this

lighter while bright is good for light rooms. In order to save the backlighter, it automatically switches off after a preset time. As if this wasn't obvious, a 'Screen Standby' message lights up on the front panel to tell you that the screen is off, rather than faulty. Hitting any key switches on the backlight again.

One interesting point is that when the backlight is removed, you can see all the custom screen de-code controllers lurking behind the screen. It always amazes me how much logic is needed to drive these large LCD displays.

Overall, I found the PC-7000 display to be much the most usable LCD display I have worked with. As well as being easy

Shift, keys and a truly enormous Enter key. The \ has also been moved from between the Z and Shift keys at the top of the section to the left of the 1.

To the right of the qwerty section is an IBM-style combined numeric keypad and editing keys. Most of the keys in this section serve a dual function, and these functions are selected by the Num Lock key.

Along the top of the qwerty keys are 10 programmable function keys arranged in two banks of five. On IBM keyboards these are usually to the left of the qwerty section rather than above it, but the PC-7000's keyboard isn't wide enough to accommodate this arrangement. Sharp does, however, provide a key legend strip on which you can write the key functions if you are confused by the layout.

I like the keyboard layout: it makes the best use of the limited space available while still being easy to use. The Caps Lock, Num Lock and Scroll Lock keys all have built-in green LEDs to indicate when they are engaged. The one oddity is a key marked 'Set-up', which I'll look at in the 'System software' section.

The only problem with the keyboard layout is that as it doesn't slavishly follow the IBM PC format, keyboard overlays for certain PC software packages won't fit, but this shouldn't be too much of a problem if you use the legend strip which is provided with the machine.

I wasn't all that keen on the feel of the unit. It has the cheap feel of keytronic units on other PC compatibles that I have never liked, but by the same token, I know people who really like this type of keyboard feel.

The review machine was supplied with the optional CE-700P printer, which was designed specifically for the PC-7000 and clips onto the back of the main unit. The driver software in the PC-7000 was designed to take advantage of some of the advanced printing features offered by the CE-700P.

The printer is a thermal unit rather than a conventional dot-matrix unit. I've never been a fan of this type of printer. Its advantage is that it is virtually silent, but to achieve good results you have to use special thermal paper. You can use a thermal transfer ribbon, but you still have to be careful about the grade of paper you use.

Having said that in general I don't like thermal printers, I must admit that this printer is capable of very high-quality printing. It works in three modes: Draft, Near Letter Quality (NLQ) and Very Near Letter Quality (VNLQ). Only the Japanese could have thought of the last description.

In addition to the three printing

'One thing is certain — there is hardly a lack of competition for this machine.'

problem by backlighting the display. The Sharp backlighter works by using an electro-luminescent panel which shines out through the LCD and makes the display glow. The problem with backlighters in the past has been their short life, but Sharp has made the backlight user-replaceable.

The length of time that the backlight lasts depends on how it is used. Sharp claims an average of around 3000 hours, although the manual quotes a worst-case length of around 1000 hours.

To change the backlight, you simply remove an endcap at the side of the screen, unclip the power to the backlight and slide it out. Close up it looks like a piece of pink plastic: it's the same size and width as the screen, but it's less than 1 mm thick. To put in a new backlighter, you slide it in, plug in the power and replace the endcap.

One of the nice things about using backlighters is that you can change the screen colour simply by changing the backlighter. The light in the review machine was white and gave a black on white display, but if I had wanted, say, a green screen, all I had to do was slide out the white backlight and slide in a green one and — hey presto! — a green screen. Fiendishly cunning, these Japanese.

In terms of usability, I was impressed by the backlit display. It puts an end once and for all to the traditional LCD screen practice of trying to position the screen so that it reflects enough light for you to read. When you switch on the machine, the screen goes dark and then flicks into life, giving off a healthy glow. The brightness of the backlighter can be set under software control to either off, normal or bright.

Normal increases the life of the back-

lighter, the display is fast and is perfectly capable of running moving graphics programs such as Digital Research's GEM. The only disadvantage of the backlight is that it uses a lot of power. This means that for the moment, the backlight is not suitable for battery-powered portable machines, which is part of the reason why the PC-7000 is a mains-only machine.

The keyboard is the same width as the main unit and contains 84 keys. Considering the restricted space available, it does a good job. The keyboard is connected to the main unit via a coiled cable and a couple of plugs and sockets.

The base of the keyboard has two feet which can be hinged down to alter the typing angle; you can either have the keyboard down, slightly raised or fully raised. Although the rest of the machine is IBM PC compatible, the keyboard doesn't follow the PC's keyboard layout. In effect, it is closer to the IBM PC/AT layout, although it doesn't exactly match even this.

The main qwerty typing section takes up most of the space, and features large

Benchmarks

BM1	1.1
BM2	3.8
BM3	7.9
BM4	8.2
BM5	9.0
BM6	15.5
BM7	24.6
BM8	26.7
Average	12.1

All timings in seconds. For a full listing of the Benchmark programs, see 'End Zone'.

modes, the CE-700P can print in two built-in fonts: Elite 12-point or Courier 10. You can add two extra fonts by plugging extra ROM packs into the printer.

Font selection and print quality selection can be done under software control from the PC-7000 using the Set-up utility, although it is sometimes necessary to set a DIP switch inside the printer to select Draft-mode printing. It also supports Epson printer control codes, so it is easy to install into applications programs which need some degree of control over the printer.

As supplied, the machine is designed to print single-sheet or roll paper only. One unusual feature is that it is capable of printing up to 10 inches wide, so you can feed paper through sideways if you need the extra width.

If you use the right paper, the CE-700P is capable of very high-quality output indeed. In its Very Near Letter Quality mode, it beats some daisywheel printers I've seen — there is no trace of the dots that make up the character. The main problem is that although print quality using thermal is very good, the paper tends to look shiny and flimsy and generally tacky; if you use better paper,

you lose print quality. It's a case of swings and roundabouts.

System software

As you would expect from an IBM PC compatible machine, the PC-7000 runs MS-DOS version 2.11. What is more surprising is that a machine from one of Japan's largest electronics companies should have to go elsewhere for its IBM-compatible ROM BIOS routines. According to the message display on start-up, the ROM routines are by Vadem Inc, late of Osborne Computers fame. It certainly is an incestuous business.

When the system boots up, it automatically takes the date and time from the internal clock. The system will happily boot from an IBM PC PC-DOS 2 disk although it won't take the system date and time.

The problem with the driver centres around the use of the Set-up key. Whenever you press this key, a ROM-based screen is displayed which allows you to change the system settings. You can do this at any time — at the DOS A> prompt, in an applications program, even

in Lotus 1-2-3. The only program in which I couldn't access the Set-up screen was in Microsoft's Flight Simulator, which isn't really surprising.

Using the Set-up menu, you can change settings for the clock, display, RS232, logical devices and printer.

The general mode of use is to use the cursor keys to highlight the setting you wish to change, and then to use the space bar to scroll through the options. For example, if you want to change the time, you select the hour or minute and hit the space bar continually until you arrive at the required time.

Using the Set-up menu to control the display settings, you can set the cursor to block, underline or underbar, and set its blink time to zero, one, two, or four seconds. You can also set the speed at which characters blink.

On the display, you can set the whole screen to normal or inverse (everything is displayed white on black instead of black on white). You can set the display controller to emulate either the IBM colour graphics adaptor or the IBM monochrome adaptor.

The backlight can be set to off, in which case the display is virtually unreadable, or to dim, normal or bright. Generally, I found normal and bright the easiest to use. Backlight timeout can be set to two minutes, five minutes, 10 minutes or permanently on.

One particularly useful feature of the set-up menu is that you can set the baud rate, data bits, stop bits and parity on the RS232 serial port as you go along. The baud rate can be set at anything from 150 to 9600 baud. If you have more than one serial I/O device fitted, the two logical I/O devices COM 1 and COM 2 can also be set.

As far as printer control is concerned, you can route printer output from the machine to the RS232 printer port or the Centronics printer port. You can also use the Set-up menu to control the CE-700P printer characteristics without any involvement from the applications program you are running. For example, if you are in WordStar and want to print in Courier rather than Elite, you hit the Set-up key and select the font. You can also use Set-up in conjunction with a DIP switch in the printer to select print quality from Draft, NLQ or VNLQ.

You can use the set-up menu to set the speaker volume and the main processor speed. The 8086 in the PC-7000 usually runs at 7.37MHz, but a few IBM applications programs rely on the IBM PC's clock speed of 4.7MHz for timing purposes. If you are running such a program, you can slow the PC-7000's processor to cope.

Technical specifications

Processor:	Intel 8086 running at 7.37MHz
ROM:	16k
RAM:	384k expandable to 704k onboard
Keyboard:	84-key IBM PC/AT style
Display:	80-column by 25-line backlit LCD
Size:	41cms (w) x 24.4 (d) x 21.5 (h) including printer
Weight:	13.5kg including printer
I/O:	RS232, Centronics
DOS:	MS-DOS 2.11

In perspective

One thing is certain — there is hardly a lack of competition for this machine. Most PC-compatible manufacturers have been in the luggable/desk-top market for years, and at first sight there doesn't seem to be any necessity for another contender.

This machine is important to Sharp for psychological reasons. Like Commodore and Apple, Sharp has always prided itself on going its own sweet way in terms of compatibility. This has led to a succession of machines which have been technically good, but which have been about as successful as the Coléco Adam.

Like Commodore before it, Sharp has now decided that perhaps it would be a good idea if its machine had a decent software base available, and this in turn means that the machines have to be IBM PC compatible. But unlike Commodore, Sharp has pitched in with a well-designed, technically advanced machine that would look good on anyone's desk, and which offers a significant performance advantage over the IBM PC.

The problem remains, however, that the only companies which have fared well in the IBM-compatible market in Australia are Compaq and Olivetti. Everyone else has been doing nickle-and-dime business.

Sharp has a nice machine which deserves to succeed, but I can't help thinking that the company is labouring behind the game.

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Applications software

As you would expect from a modern, reputable IBM PC compatible machine, the PC-7000 runs the vast majority of popular IBM PC programs. Lotus 1-2-3, Flight Simulator and GEM all ran significantly faster than they do on the IBM PC, thanks to the PC-7000's uprated processor and faster clock speed.

The only problem with graphics-based programs is that they look distorted on the LCD screen, as 80-column by 25-line LCD screens tend to be more than twice as wide as they are high. This means that although the pixel resolution is the same as the IBM screen, graphics have a habit of looking squashed.

Documentation

The PC-7000 was supplied with three pre-release photocopied and bound manuals. The first was a general-purpose operations manual, the second an internal options manual, and the third is a general-purpose MS-DOS manual.

Of the three, I found the internal options manual the most helpful as it instructed me how to take the machine

apart, and had a useful technical specifications section. The operations manual also looks useful to purchasers of the PC-7000. Although my copy was a photocopy of the proof, it contained lots of useful pictures and the text was easier to understand than the usual Japanese-style English.

Prices

The PC-7000 retails for \$3,600, including tax; the CE-700P thermal printer sells for \$800; and the expansion unit, including a 3½in 10Mb hard disk costs \$3,500. A carrying case is available for an additional \$150.

Other bits and pieces are a 128k RAM upgrade which sells for \$100; an LCD back-lighter panel (\$95); and a colour adaptor for RGB output (\$400).

Conclusion

It's amazing how, after some time spent in this business, first impressions count for a lot. When I first saw the machine, I liked it. It looks neat and tidy; it's small and well put together, but I still think that it looks more like a photocopier than a micro.

In terms of engineering, the Sharp is

also very good. The main PCB is truly minute considering that it contains everything including the disk controller, the RS232 port and the Centronics port. The only disadvantage of the compact design is that you can't fit IBM PC boards into the basic machine — you have to buy the expansion box, but this shouldn't be a problem for most users as the parallel and serial ports, and all the memory required, are all contained on the main keyboard.

As far as I know, the backlight LCD screen represents a production first for Sharp. It certainly works considerably better than unlit LCDs, and being able to change the colour of the display at will is fun if a little trivial.

I don't know if I would buy the printer. It's nice that it is designed to fit with the rest of the system and clips onto the main unit, and the print quality is also excellent if you use the correct paper, but I can't overcome my dislike of thermal printers — even good ones.

I liked the Sharp PC-7000 a great deal. It's faster than the IBM PC, it runs the popular PC programs, and it looked ten times better. Not bad at all.

END

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Voice Master

Make smalltalk — or even sweet music — with your Commodore 64 with the aid of the Voice Master speech digitiser. Stephen Applebaum conducts the conversation.

The trouble with many of today's speech synthesisers is that the time and effort required to make them say even the simplest words is extravagantly disproportionate to the result. Even some of the more expensive systems produce a voice that speaks with all the verve and clarity of a punch-drunk boxer with a glove in his mouth.

It was with some anticipation, therefore, that I awaited the arrival of Voice Master, a \$149 speech digitiser for the Commodore 64 that's claimed to reproduce sounds with almost absolute fidelity.

In use

To use Voice Master you need a disk drive (or data recorder), and a thick skin to counteract the sardonic remarks that are bound to be hurled your way by amused onlookers. The object of their hilarity is the ridiculous Captain Scarlet-like headset that you're required to wear to input sounds to Voice Master.

To get going with the system takes little more effort than plugging a small silver box containing the encoding circuitry into the Commodore 64's joystick port two, and attaching the headset to the top of the box via a small jack plug. A program is then loaded from a utilities disk.

Prior to recording, it's necessary to calibrate Voice Master by adjusting a potentiometer in the box itself. The hardware manual suggests using a screwdriver to perform this operation, but I was lucky enough to have been supplied with a special designer tool — a thin piece of metal meticulously shaped to fit into a small hole on the front of the Voice Master.

Although there is no need to open Voice Master, it's worth it just to see the simplicity of its design. Inside the case is a printed circuit board (PCB) peppered with transistors. In between these transistors are several capacitors, a poten-

tiometer, and three chips. Towards the outer edges are three jack sockets comprising two ear-outs and one mic-in.

Voice Master's *piece de resistance* is the digitisation of sounds input through the microphone. It can also respond to spoken words, albeit rather crudely. There is also an interesting little oddity called a voice harp, but more of that later.

Familiarisation with Voice Master's capabilities is best achieved with a small demo program found on the utilities disk. Short but sweet, this program gives easy access to the hardware's recording and playback functions, as well as allowing you to slow down, speed up or add echo to your recordings.

Although effective as an introduction, 'demo' is extremely limited, and ambitious users will want to move on to more complex activities such as adding speech to their own programs. To this end, a small machine code utility called VM2.1 has been provided.

There are several ways of loading VM2.1, but the simplest is to type:
LOAD "VM2.1",8,1 (RETURN)
SYS 49152 (RETURN)
NEW (RETURN)

These few lines load the VM2.1 code into memory at location 49152 (C000 hex), somewhere between the computer's random access memory (RAM) and Basic read-only memory (ROM). However, this method should not be used if there is already data in the Basic work area, as it will all be erased by New. But don't despair — VM2.1 can be loaded from within a Basic program, although the method for doing so is rather more complicated than that shown.

Recording

To record a word, put on the headset, type LEARN n (where n is a number in the range 0 to 63) and talk into the microphone. As you speak, the Com-

modore's display goes blank, indicating that Voice Master is recording your utterance for posterity.

Playing back a recording involves using the command Speak. Similar in syntax to Learn, Speak also needs a number after it, to tell Voice Master the word that you want to hear. If, for example, you've recorded the word 'hello' as Learn 6, you'd type Speak 6 to hear it spoken.

Both Learn and Speak are recognised as legitimate Basic commands, and, therefore, can be included within a user program. The following two short listings give examples of how Learn and Speak can be incorporated into your own programs. The first is a routine to produce a screen prompt, asking the user to input a word; the second simply runs through the vocals recorded in the first.

Program 1

```
10 FOR M=0 TO 63
20 PRINT "SPEAK WORD NO."; M
30 LEARN M
40 NEXT M
```

Program 2

```
10 RESTORE
20 READ N
30 SPEAK N
40 GOTO 20
50 DATA 0,1,2,3,4,5,6,7 ..... 63
```

The speed at which Voice Master speaks is defined on a scale between 0 and 10. Normally, a word will be spoken with the default value of 6, but this can be altered to either speed up or slow down the intonation, using the command Speed.

Unlike Speed, which operates on pre-recorded speech, Rate alters the speed at which a word is recorded. Usually a word will be recorded at 7100 bits per second, but can be changed, along with Speed, to play back a phrase faster and with natural pitch.

The command New, as mentioned earlier, leaves digitised words in memory



but erases all your Basic statements. Clear, on the other hand, is rather more drastic, wiping out both. Space-conscious programmers will find Clear useful though, as it can set aside chunks of memory for the storage of words.

Like all the Voice Master commands, Clear must be followed by a number, this time in the range 16 to 160; this number signifies the memory location for the new text. For example, if you were to execute the command Clear 160, you would actually be telling Voice Master to start loading a new vocabulary at memory location $160 \times 256 = 40960$ (which, incidentally, is the Basic workspace, giving the user maximum room for Basic programs).

One of Voice Master's major advantages is that words recorded with it can be played back on any Commodore 64, as long as VM2.1 is present in memory. In other words, even users who do not own the digitising hardware can utilise the speech in their programs.

Apart from recording straight speech, Voice Master, aided by a neat utility called Voice Harp, can turn your senseless verbiage into music. Not only that, it

can even reproduce your musical score on hard copy.

Sub-programs

Voice Master comprises three sub-programs, the first of which is called Hum-Along. On loading, Hum-Along presents the user with a menu made up of 19 options. The first eight are pre-set sounds which can be manipulated to represent different instruments, and are then saved to disk. By selecting one of the sounds and humming into the microphone, you can create a simple melody using one instrument. In the main, Hum-Along does little more than allow you to perfect the sounds of an instrument or become accustomed to the system.

Far more interesting than Hum-Along is a program called Composer. This has an advantage over the previous utility in that it allows users to construct whole songs and save their efforts onto disk. In addition, a Write mode gives a visual representation of the tune being constructed, in full musical notation.

Writing a song means humming, whistling or dah-dah-dahing into the

microphone, a process which is best performed in a quiet, and preferably empty room. During your — hopefully unwitting — performance, a musical staff slides across the screen with the appropriate notes appearing along its length. When you've finished, mistakes can be corrected in Edit mode and your full score printed out on a dot-matrix printer.

Conclusion

At \$149, Voice Master is an affordable leap forward for speech reproduction on the Commodore 64. Unlike phoneme-type devices, which always seem to babble away in a monotonous and neutral tone, Voice Master is able to differentiate between male and female voices, as well as capture the speaker's accent.

Voice Master is an excellent peripheral for both the serious user and those who merely want to dabble.

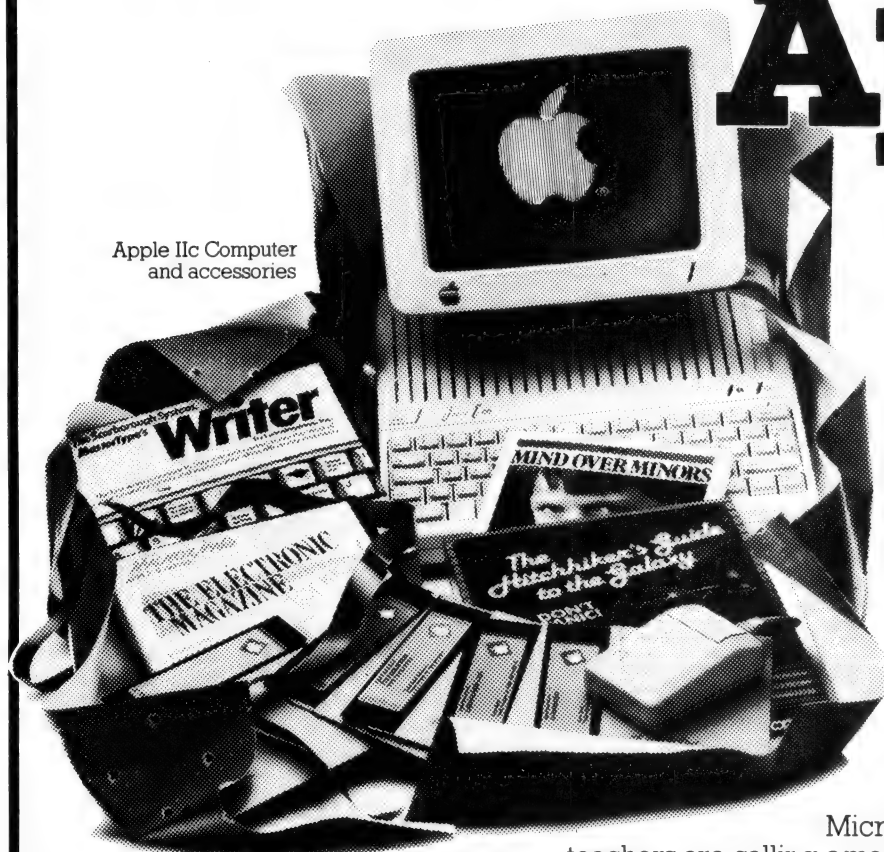
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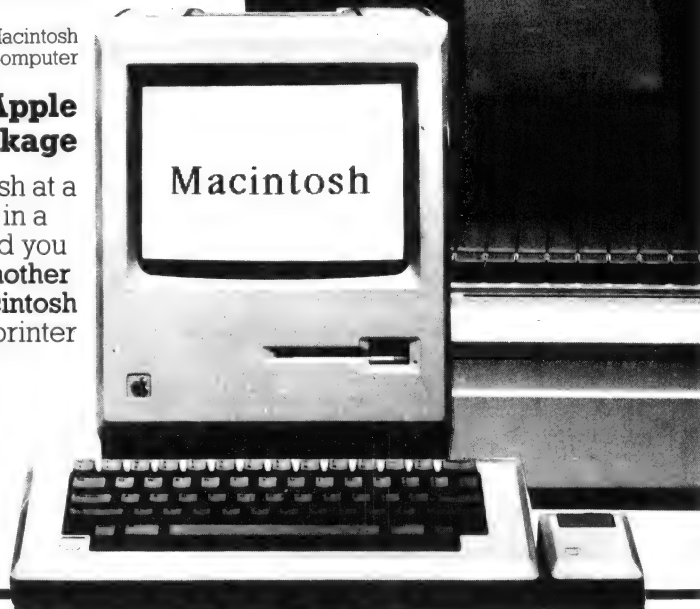
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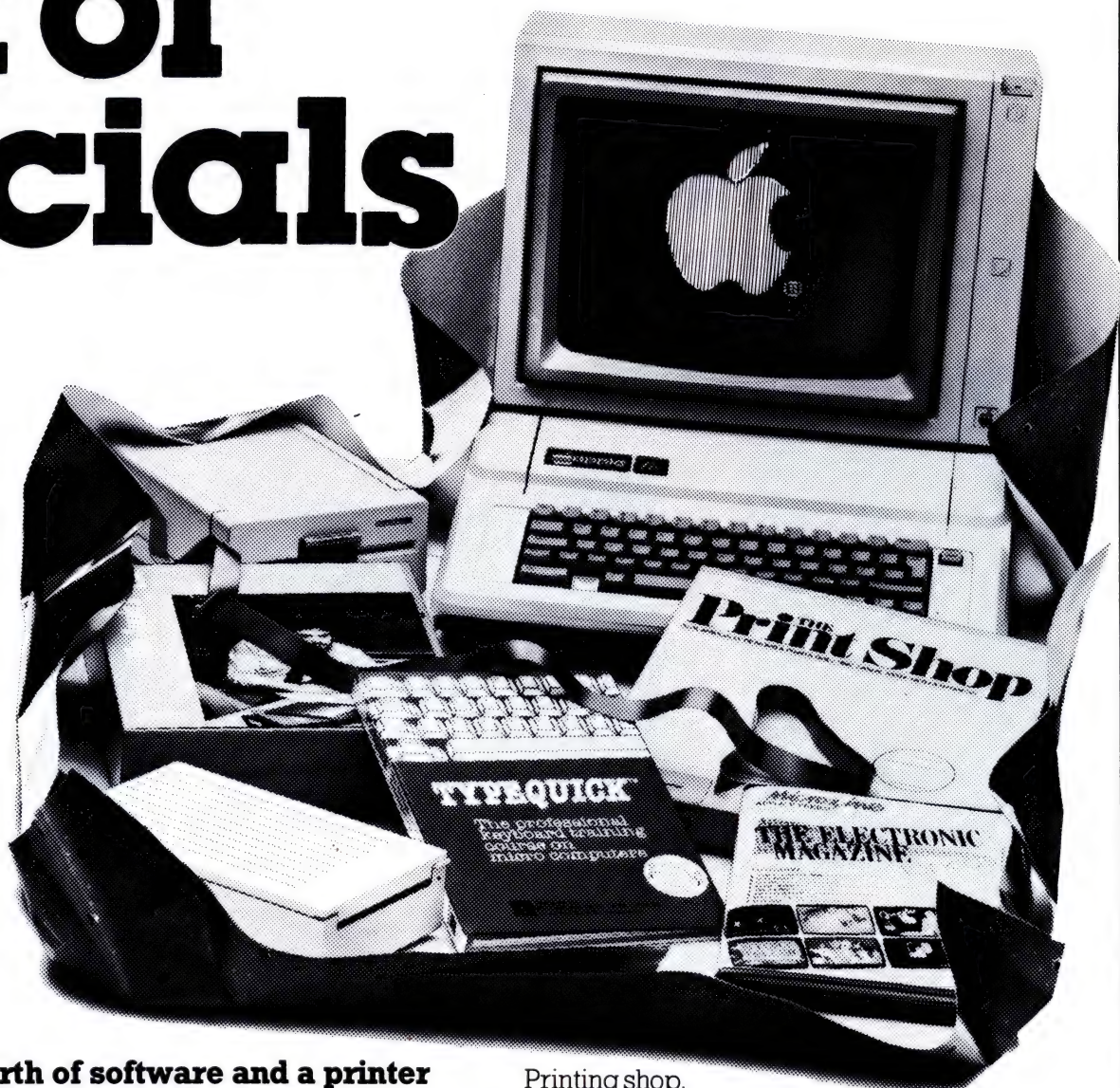
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Apricot XEN

Apricot has had its fair share of problems, but, undaunted, is retaliating with the XEN — a fast, powerful competitor to the IBM PC/AT. Peter Bright puts Apricot's 'great white hope' through its paces.



Lately, Apricot has been going through something of a bad patch, with a write-off for its portable machine and a declining share price. However, when IBM launched its PC/AT business micro with its powerful Intel 80286 processor, it was only a matter of time before ACT would respond with its own 286 machine.

Now it has done so with a machine which is claimed to be significantly faster than the AT, and which comes with either 512k or 1Mbyte of RAM as standard, Microsoft Windows, and bundled applications software at an entry-level price of \$6,000.

Hardware

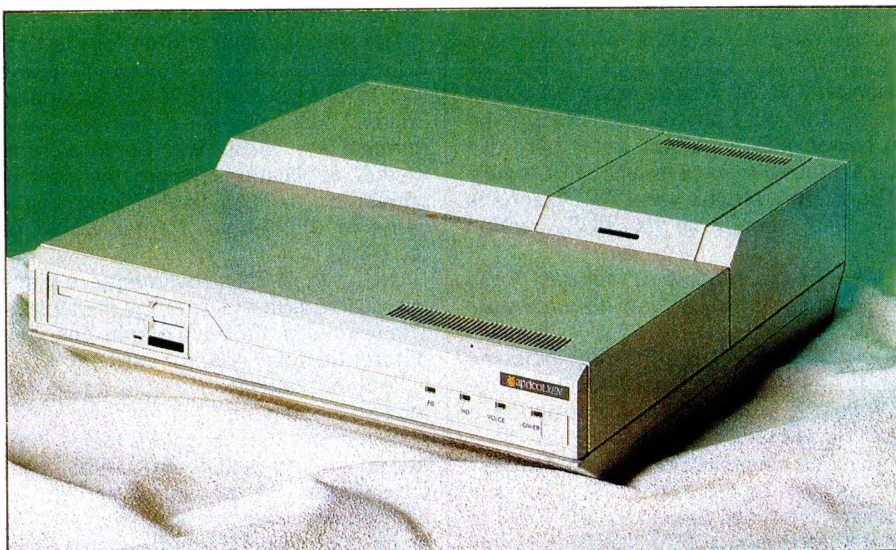
Visually, the Apricot XEN is a very striking machine. The main system box is a split-level unit with a low-profile front panel. In fact, it looks suspiciously like two Apricot F1s stuck side by side. The monochrome monitor unit is very large and of a strangely angular design; it is so large, it completely dominates the machine's appearance. Like the monitor, the keyboard has a distinctly angular look, with the top left-hand chopped off. All three units are finished in cream and made of injection-moulded plastic.

In addition to the three main units, the XEN also comes with a large black external power supply box which should be placed somewhere out of the way. Usually, business micros house their power transformers inside the main system unit, but it wouldn't have fitted inside the XEN without increasing the height of the main box. Initially, I found the idea of an external power supply annoying, but once the machine was set up on my desk I must admit I forgot it was there.

One of the first things to worry me was the lack of rigidity in the XEN's plastic casings. Although the review machine came with pre-production plastics, they look and feel similar to those on the Apricot F1, which has always been a flimsy machine. The result is that the monitor wobbles alarmingly when placed on top of the main system unit; this isn't what I would expect of a \$6000 plus machine.

The main system box is a commendably small unit measuring just 8cms high by 38cms wide by 37cms deep. The height rises to just under 10.5cms at the back. Much of the space-saving is achieved by using the external power supply.

The front panel houses either one or two 3.5in disk drives depending on the model you choose, as well as four LEDs



The Apricot XEN system box

marked 'FD', 'HD', 'VOICE' and 'POWER'. If you have a hard disk fitted, it lives behind the front panel and isn't visible from the outside.

The left-hand side panel houses the keyboard socket, while the right-hand panel houses removable covers to allow the connection of the optional IBM PC expansion card box.

The rear panel is relatively uncluttered and houses an on/off switch, a 15-way D socket for the power supply input, a Centronics printer port, an RS232 serial port, and a regulated low-voltage output port. In addition there are covers for six Apricot expansion cards, of which one was used for the display card.

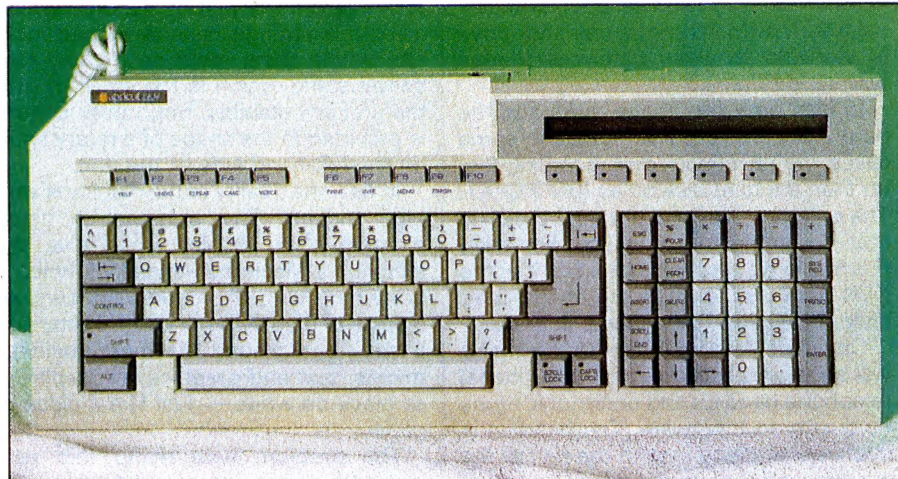
If you want to add or remove an expansion card, the top cover on the system box contains a removable lid so that you can get at the slots without opening up

the rest of the system box. Assuming that you want to get right inside the main system box, you simply remove two screws and slide off the top cover and back panel.

The main PCB is large and occupies all of the available floor space within the system box. It contains all the necessary circuitry except for the display driver, which uses up one of the expansion slots.

The front of the machine is dominated by the cages for the disk drives. Three bays are provided, allowing you to add an extra hard disk. The main PCB houses all the driving circuitry for the I/O ports as well as the main processor RAM and ROM. The six expansion slots are Apricot PC compatible, so you can plug in a variety of standard Apricot cards.

The main processor in the XEN is an



The XEN's imposing hybrid keyboard

Intel 80286 running at 7.5MHz. A socket is also provided for the 80287 maths co-processor for maths-intensive applications. Standard RAM for the twin-floppy machine is 512k, while the hard disk machine comes with 1Mbyte as standard. RAM boards stack on top of each other out from the main PCB, giving a Tower of Babel effect. Total RAM can be extended to a maximum of 5Mbytes. The ROM contains what ACT claims is the final version of its BIOS, version 3.1.

One of the interesting features of the XEN is that it uses fast, no wait state RAM. The 80286 pipelines its instructions by loading more than one machine code instruction from RAM at a time. While it is processing one instruction, it can be preparing the next.

On machines with slower RAM access times such as the IBM PC/AT, the processor often has to wait for the RAM to get its act together. The fast RAM on the XEN means that the pipelining is not interrupted by wait states, so the processor throughput and performance is correspondingly higher.

driver software, the XEN could be a useful voice and data communications tool. Unfortunately, these add-ons were not available at the time of writing.

The second major add-on for the XEN is an optional external box which allows you to plug in two IBM PC expansion boards. ACT maintains that the main demand for these will be in vertical market applications where the cost of converting existing IBM PC expansion cards to the Apricot format would be too high.

One of the XEN's advantages is that it is available with a wide range of displays. The trouble is that each monitor needs a different display adaptor card.

Four monitors are available. At the bottom you could use the existing green screens from the Apricot PC range. Next up is a high-quality 800x400 pixel paper-white P4 phosphor screen for high-quality monochrome displays. As far as colour is concerned, you can either have a medium-resolution 640x200 pixel four-colour display or a high-resolution 640x350 pixel 16-colour display.

scanning flicker could become noticeable. The Mac and the XEN get around this by using a 60Hz scan rate instead of the usual 50Hz.

The result is that the XEN achieves an impressive display: word processing, for example, benefits enormously from the black-on-white display. The only slight niggle is that icons and letters on the white monitor can look slightly elongated, as if they were originally designed for a display with a different vertical/horizontal pixel arrangement to the 800x400 pixel XEN screen.

The only other problem with the review monitor was that the display was slightly ragged along its edges. I assume that this was an adjustment problem on the pre-production monitor on the review machine, and that production units won't suffer similarly.

The keyboard on the XEN is an imposing unit. In fact it is something of a hybrid, incorporating features from both the Apricot PC and the IBM PC/AT keyboards.

The keyboard connects to the main unit via a short coiled cable and a clip-in plug. The cable is so short that using the keyboard contains two connection ports, one for the Apricot mouse and one for a microphone to allow for the addition of speech recognition at a later date (let's hope that when it comes, it performs better than that on the Apricot Portable!).

It's good to see that Apricot has ditched the infra-red keyboard link used on the Apricot F range, and returned to the old-fashioned coiled cable for the XEN. Invariably the only way I could use the F keyboards was with the light pipe, which was like having a cable anyway.

The keyboard contains 102 keys arranged in five functional groups. The main qwerty typing section takes up about three-quarters of the width; to its right are the editing and cursor keys, and to their right is the numeric keypad.

Running along the top of the keyboard are two groups of function keys. To the left there are 10 function keys which give some degree of compatibility with the IBM PC/AT. To the right are six more function keys, and an LCD microscreen to keep compatibility with the Apricot PC keyboard. The microscreen on the XEN has the advantage of being backlit, so the screen glows blue at night.

To give the IBM function keys something to do when they are not required for IBM-style applications, they are also marked 'Help', 'Undo', 'Repeat', 'Calc', 'Voice', 'Print', 'Intr', 'Menu' and 'Finish'. This allows them to be used with some of the bundled Windows applications programs.

Although the keyboard has some IBM touches, the overriding influence is

The 80286 pipelines its instructions by loading more than one machine code instruction from RAM at a time. While it is processing one instruction, it can be preparing the next.

Initially, the XEN will be sold in two configurations. The entry-level machine comes with twin 720k 3.5in microfloppy disk drives. The more expensive version will have one 3.5in microfloppy and one 3.5in 20Mbytes hard disk. An optional second 20Mbytes hard disk can also be added, bringing the total to 40Mbytes. In addition, an optional external 5.25in IBM PC compatible disk drive is available to allow data interchange with IBM PCs.

In use, both the floppy disks and the hard disks are very fast indeed. In some cases, the XEN floppy disk is actually faster than the hard disk on an IBM PC/XT. The only complaint with the hard disk is that it is rather noisy in use; however, this has to weigh against the fact that the XEN hard disk is easily the fastest hard disk installation I have come across.

One novel feature of the XEN is that it will shortly be available with an optional telephone handset and communications hardware and software. The handset is designed to blend in with the rest of the system, and clips to the left-hand end of the keyboard. When this is combined with the optional modem and special

The review machine was supplied with the 800x400 pixel white P4 phosphor screen, which is the unit most likely to be supplied with the majority of machines.

The XEN white monitor is one of the largest 12in monochrome displays I have seen. The tube is angled upwards slightly from the rest of the unit, which gives it a strange banana-shaped look. The whole thing rests on a puny tilt/swivel stand which is too small to give the unit any stability. Brightness control is provided in the shape of a rotary knob on the left-hand side of the unit.

In use, the quality of the display is very high indeed. The purpose of using a paper-white display is to give the machine a Macintosh-style look when it is running with Microsoft Windows, so instead of displaying white characters on a black background like most business micros, text and graphics are displayed as black on white — just like a piece of paper.

The problem with doing this successfully is that you need a high-quality monitor. The danger is that with so many white pixels switched on at once, the



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